REFERENCE DEPT.

AVIATION

The Oldest American Aeronautical Magazine

SEPTEMBER 6, 1926 | Issued Weekly | PRICE 15 CENTS

The Sesqui-Centennial Exposition from the air (Sesqui flying field on the left)

(c) Victor Dallin

VOLUME XXI

NUMBER 10

SPECIAL FEATURES

NAVIGATING THE AIRPLANE RELIABILITY TOUR

MANY CIVILIAN PLANES ENTER NATIONAL AIR RACES

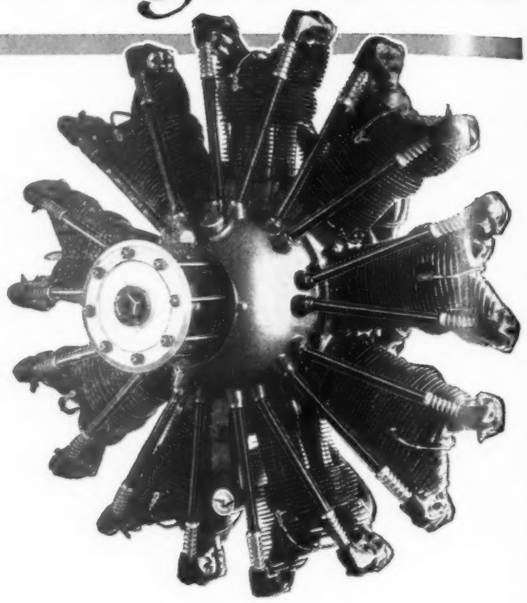
GARDNER PUBLISHING CO., Inc.
HIGHLAND, N. Y.
225 FOURTH AVENUE, NEW YORK
Entered as Second-Class Matter, Nov. 22, 1920, at the Post Office, at Highland, N. Y. under Act of March 3, 1879.

TOLEDO PUBLIC

Air Cooled Fighters

"Wasp" leadership, established through improvement in basic design, has resulted in a new and broader application for radial air cooled engines.

These unusual qualities coupled with Pratt & Whitney's unexcelled workmanship make for the fine performance and dependability so vital in both military and commercial flying.

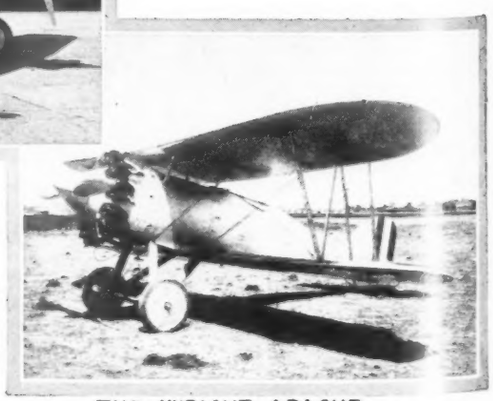


THE WASP
425 H.P. at 1900 R.P.M.
Weight 650 lbs.

Wasp Engines are now flying in these Navy Fighters

THE CURTISS HAWK

THE BOEING FIGHTER



THE WRIGHT APACHE

PRATT & WHITNEY, U.S.A. DEPENDABLE ENGINES

THE
PRATT & WHITNEY AIRCRAFT CO.
HARTFORD CONNECTICUT

THE

ADVANCE AIRCRAFT CO.

LARGEST PRODUCERS OF COMMERCIAL AIRCRAFT IN AMERICA ANNOUNCE

PRICE REDUCTION

ON THE IMPROVED

WACO-9

THREE-SEATER

$2250.

AT TROY, OHIO

More WACO'S are now in service for profit and pleasure than all other planes now in production in America.

THE PERFORMANCE MADE THE DEMAND

Write for Details

THE ADVANCE AIRCRAFT COMPANY
TROY, OHIO

POSTAL TELEGRAPH - COMMERCIAL CABLES

CLARENCE H. MACKAY, PRESIDENT

RECEIVED AT

This is a fast Telegram unless otherwise indicated by a figure after the number of words—Day Letter, "N. L." (Night Letter) or "Blue" (Night Telegram)

TELEGRAMS TO ALL AMERICA

CABLEGRAMS TO ALL THE WORLD

DELIVERY NO.

STANDARD TIME INDICATED ON THIS MESSAGE

45 NB 23 RADIO VIA RCA

S S CHANTIER SVALBARD RADIO MAY 15-1926

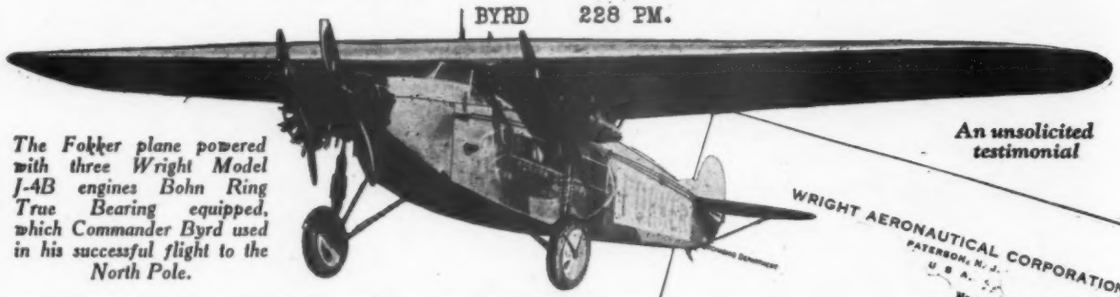
RADIO WRIGHT AERO CORPORATION

PATERSON NJ

WRIGHT MOTORS FUNCTIONED PERFECTLY ON SIXTEEN HOUR POLAR FLIGHT

DIDNT MISS A REVOLUTION AND IS GREAT MOTOR.

BYRD 228 PM.



The Fokker plane powered with three Wright Model J-4B engines Bohn Ring True Bearing equipped, which Commander Byrd used in his successful flight to the North Pole.

An unsolicited testimonial

WRIGHT AERONAUTICAL CORPORATION
PATERSON, N. J.
U. S. A.

May 20, 1926.

Mr. C. W. Eggenweiler,
Bohn Aluminum & Brass Corp.,
Detroit, Mich.

Dear Charles,

I am sending you the front and rear views of the J-4B engines and a photo of the Fokker plane in which these engines were installed. This is the plane that Commander Byrd made his famous trip to and from the North Pole.

I am very much pleased to write you that these engines were fitted with Bohn Aluminum bearings in the master connecting rods.

I am also enclosing copy of the telegram received from Commander Byrd who commented favorably on our engines.

I believe that the Bohn Aluminum Co. will appreciate receiving this information.

Yours very truly,
WRIGHT AERONAUTICAL CORPORATION,
By _____
Purchasing Agent.

D.McWhir
J.S.

Bohn Ring True Bearings picked for Supreme Test

Because of the great responsibility of bearings in any engine—we are especially proud that Bohn Ring True Bearings were picked for this supreme test of aviation design.

The Type of Bohn Ring True Bearing used in the three Wright Model J-4B airplane engines which powered the plane.

Bohn Products include Ring True Bearings — Bohnalite Castings, both permanent mold and sand, Nelson Bohnalite pistons; we also supply the government with replacement pistons and bearings for the Liberty engine.

BOHN ALUMINUM & BRASS CORPORATION
EAST GRAND BOULEVARD, DETROIT

When Writing to Advertisers, Please Mention AVIATION

BOEING AIRPLANE COMPANY

Manufacturers

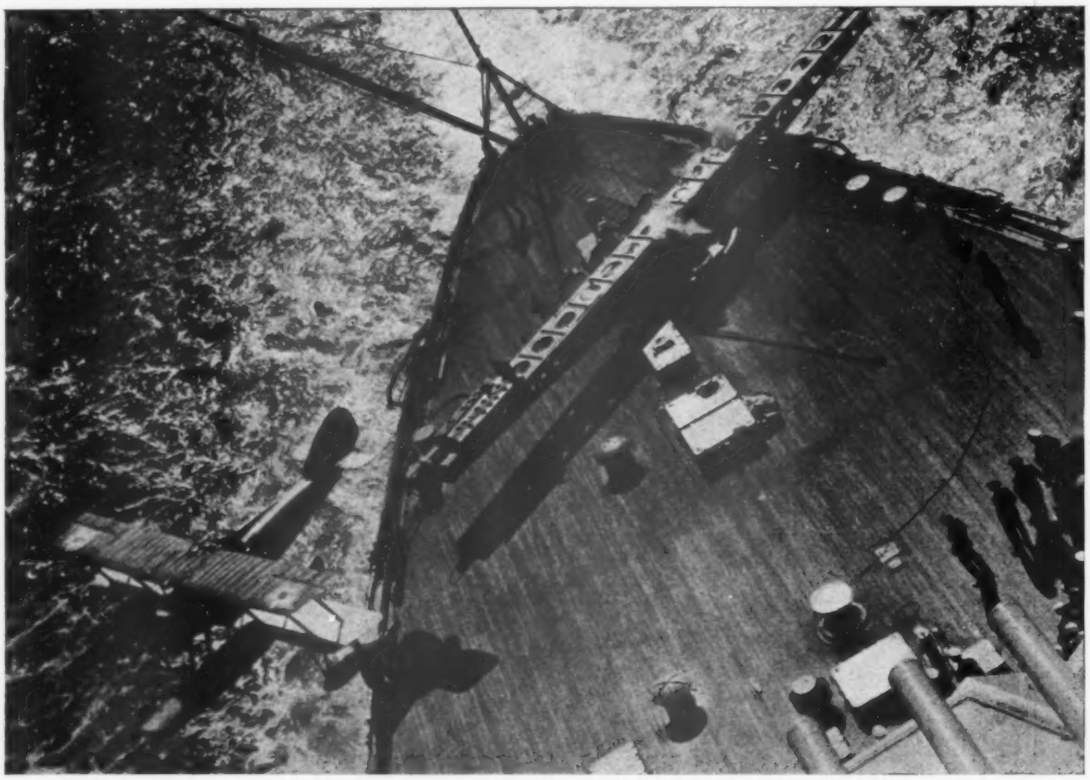
of

Military and Commercial Aircraft

Seattle, Washington

Aeroplanes VOUGHT

"PERFORMANCE BEYOND COMPARISON"



THE VOUGHT-UO

MORE UOs ARE IN DAILY USE IN THE U. S. NAVAL AIR SERVICE THAN ANY OTHER AIRPLANE

Aeroplanes VOUGHT

CHANCE VOUGHT CORPORATION

Long Island City New York

SEPTEMBER 6, 1926

AVIATION

VOL. XXI. NO. 10

Published every Monday

CONTENTS

Editorials 401

Guggenheim Fund Endows Universities 402

Airports and Airways 423

Publisher's News Letter 438

GARDNER PUBLISHING COMPANY, Inc., *Publishers*

BUSINESS AND EDITORIAL OFFICES: 225 FOURTH AVENUE, NEW YORK
CABLE ADDRESS: AEROENG
Publication Office
HIGHLAND, N. Y.

Subscription price: Four dollars per year. Canada, five dollars. Foreign, six dollars. Single copies, fifteen cents. Back numbers 25 cents. *Copyright 1926, by the Gardner Publishing Company.*

Issued every Monday. Forms close ten days previously. Entered as second-class matter Nov. 22, 1920, at the Post Office at Highland, N. Y., under act of March 3, 1879.

SCINTILLA

First
Second
Third

In the Ford Reliability Tour

SCINTILLA Aircraft Magnetos furnished ignition for the Wright Whirlwind Engines that finished First, Second and Third in the Ford Reliability Airplane Tour.

MOST of the airplanes of late design to be seen at the National Air Races, Philadelphia, Sept. 4-11, are powered with engines equipped with SCINTILLA Aircraft Magnetos.

Contractors to the U. S. Army and Navy.

SCINTILLA MAGNETO COMPANY, INC.

Factory and Offices **SIDNEY, NEW YORK**

SEND FOR DESCRIPTIVE BOOKLET

A PREDICTION REALIZED

The New Curtiss "FALCON"

DURING the past several months, the first group of Curtiss "Falcons" to be delivered to the Army have been undergoing service tests in the hands of Air Corps pilots.

As was foreshadowed when the "Falcon" won first prize in the Observation Competition at McCook Field, this new observation airplane has rapidly gained favor with the flying personnel, who have found it much faster and more maneuverable than the present service type.

Powered with either the Curtiss D-12 or the Liberty motor; excellent from a maintenance standpoint; with a truly remarkable performance, the "Falcon" fulfills its advance indications of being the finest observation type in service today - a worthy "big brother" to the Curtiss "Hawk", the standard service pursuit plane of the U. S. Services.

THE CURTISS AEROPLANE & MOTOR COMPANY, INC.
GARDEN CITY, N. Y. BUFFALO, N. Y.

L. D. GARDNER
PRESIDENT
EARL D. OSBORN
VICE PRESIDENT
L. D. WEBSTER
TREASURER
GEORGE NEWBOLD
BUSINESS MANAGER

AVIATION

W. LAURENCE LEPAGE
EDITOR
VIRGINIUS E. CLARK
RALPH H. UPSON
CONTRIBUTORS

VOL. XXI SEPTEMBER 6, 1926 No. 10

The Formula Question

IT HAS been stated by well known aeronautical engineers that a good designer knowing beforehand the formula to be used in judging the Reliability Tour could have designed a plane which would necessarily have won the Tour. If this is so and planes can be designed to meet a given formula, the matter should be studied with the greatest care in order that the formula may develop a really practical plane of a type which is needed. The formula used this year seems to have worked out satisfactorily, but it seems to have put quite a premium on the planes with a high performance but carrying comparatively few passengers for their power.

This year's Tour endeavored to produce a formula which would suit all types of planes from the giant three-engine transport to the single-seater lightplane. That the formula worked successfully was partly due to the fact that there was only one entrant of each of the two extremely divergent types, and that neither of these were really officially entered in the race and neither completed the course. It is rather doubtful whether any universal formula can be devised which will foster the development of all types. This year's Tour was so successful in arousing the interest, not only of the general public but of the aircraft manufacturers as well, that it certainly seems that it would pay in the future to divide the Tour up into various classes so that the formula would give definite encouragement to specialized types.

For example, there seems to be a growing desire for a two-seater plane for school and pleasure purposes. If a formula were devised which would encourage this type and special prizes were offered, there would undoubtedly be several such entrants in next year's Tour, and the Tour would help to create a new and needed type. In the matter of aerial service and transport types of planes the desirable features of the various types could be carefully studied so as to put a premium on these qualities. The matter of devising a formula is not an easy one, but if a formula is to be used it should be carefully studied out beforehand, classifications decided upon and the formula announced sufficiently beforehand so that designers may build or modify their machines to realize the qualifications encouraged by the Tour officials.

Navigating Cross-country Flights

WHILE IT is true that in the services, military and naval fliers have been trained to depend on navigation instruments to a very large extent in carrying out cross-country flights, the civilian flier in general pays comparatively small regard to this phase of flying. For the most part he has learned to fly and to depend upon the ground objects in maintaining a correct course. The question of scientific navigation enters little into his activities and he is, in fact, to be congratulated upon the success he obtains from his instinctive sense of direction.

However, the importance of a certain degree of what may be termed scientific navigation with the aid of good instruments cannot be overlooked and was very admirably brought out in the performance of the Travel Air plane in the Commercial Reliability Tour. It would appear, from the navigator's own account, that the true course maintained by this machine in the Tour was possible largely as a result of careful map reading and the accurate determination of drift. These features are important and do not involve the use of very elaborate instruments nor do they call for much navigating experience but the results obtained from a little attention given to these problems have been demonstrated to be well worth while.

Disappointing Lightplane Progress

WHEN THE lightplane movement first appeared, great things were prophesized for this type of airplane. Enthusiasts predicted a rapid growth and outsiders, astounded by the extraordinary efficiency and economy of the type, were convinced that the day of the "flivver" plane had arrived. Almost four years have passed since lightplanes first made their records of fuel economy and showed that they had the speed and ceiling and could be built at a price which would allow of a large market. Yet today, there is no factory which is turning out lightplanes in quantity, unless we count the De Havilland Moth or the Pander as lightplanes and this should hardly be done since each of these planes require as much horsepower per passenger as a Waco.

The lightplane has not fulfilled its early promises and the true lightplane which carries a passenger on fifteen horsepower or less seems to be dissappearing. This failure of development has been laid to many causes, lack of public interest, etc. The truth is not far to seek. There are two major elements in the development of aeronautics, namely, economy and safety. The lightplane possesses the first of these to an extraordinary degree but is wanting in the second. The lightplane was never destined to be used by the professional pilot, since he needs a larger vehicle to pay the expenses of his salary and carry his pay loads but it was destined to bring down the cost of flying so as to popularize its use. This necessarily meant that lightplanes were to be flown by amateurs, in spite of the fact that due to its low power and light wing loading a lightplane is really more difficult to fly than a larger plane.

As the lightplane must be flown by amateurs or students it will not come into its own until it is made as easy or easier to fly than the more powerful airplanes. The development of the lightplane has already contributed a considerable amount of aerodynamic knowledge and its further development should certainly be encouraged by the giving of prizes and the organizing of sporting events in which low power machines can be entered. Such contests are of great technical interest but to be of the greatest practical value a premium should be placed on the qualities of safety and comfort rather than the main emphasis being placed on speed and gasoline economy.

Guggenheim Fund Endows Universities

Leland Stanford University and California Institute of Technology to Become Centers of Aeronautical Research and Learning.

GRANTS aggregating approximately $600,000 to two California educational institutions have been authorized by the Trustees of the Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc.

To Leland Stanford University, at Palo Alto, a fund amounting to the income on $300,000 has been awarded for the financing of experiments and study in aviation and aeronautics. Simultaneously, there has been awarded to the California Institute of Technology at Pasadena $200,000 for the immediate erection of a permanent building to be devoted to the study of aeronautics; in addition, grants totaling about $100,000 will be made over a period of ten years for the conduct of study and experiments in this rapidly developing science and art.

In announcing the two gifts, Harry F. Guggenheim, president of the Daniel Guggenheim Fund, stated that they were made not merely in recognition of the opportunities for study and research which the climatic and other conditions in California made possible, but also as a tribute in recognition of the distinguished work in science and education and the very great contributions to progress made individually by these two educational institutions.

The Daniel Guggenheim Fund for the Promotion of Aeronautics was established by Mr. Daniel Guggenheim last February, with a provision for supplying $2,500,000 as needed by the Directors. The Fund is unique among the large foundations of the country in that its founder did not contemplate a permanent foundation, but merely a provision for sums which would make possible experiments and developments in the field of aviation during the infancy of this art and science as a civil enterprise.

Importance of Safety

The Trustees recently announced that a primary aim of the Fund would be the promotion of safety in flying. It is felt that if a fair factor of safety is established in the practice of aviation other measures of progress will follow rapidly. Aviation is now on the verge of developments which will make it clear that not only is flying over great distances mechanically feasible but that the whole art and science can be placed on a basis of safety comparable with traveling by rail, steamship or automobile.

Dr. R. A. Millikan, president of the California Institute of Technology, has announced in Pasadena, Cal., that the grant made by the Daniel Guggenheim Fund to the Institute would be used as a basis for the establishment of the Daniel Guggenheim Graduate School of Aeronautics at the California Institute of Technology.

There will be constructed immediately an Aeronautics Building containing a new ten-foot, high speed wind tunnel, the total construction involving an expense of approximately $200,000.

Calif. Inst. of Tech. Proposals

The Daniel Guggenheim Fund has allocated to the Institute, in addition to the $200,000 available immediately, the sum of $10,000 annually for ten years. These funds will make possible the following:

The extension of its theoretical courses in aerodynamics and hydrodynamics, with the underlying mathematics and mechanics, taught by such men as Professors Harry Bateman, Edward T. Bell, and Paul S. Epstein.

The initiation of a group of practical courses conducted by the Institute's experimental staff in cooperation with the engineering staff of the Douglas Airplane Co., with the aid of the facilities now being provided at the Institute combined with those of the Douglas plant.

The iniation of a comprehensive research program on airplane and engine design, as well as on the theoretical bases of aeronautics.

The immediate perfection of the new stagger-decalage, tailless airplane recently developed at the Institute, primarily by A. A. Merrill—a radical departure from standard aeronautical design, which in recent tests has shown promise of adding greatly to the safety of flying.

The establishment of a number of research fellowships in aeronautics at the California Institute.

The planning and manning of the new school so as to include the building and testing, not only of models for wind tunnel work, but also of full-size experimental gliders and power planes for free flight work.

The grant made to Leland Stanford University by the Daniel Guggenheim Fund, represents the income from a capital sum of $300,000, which will be used for the development at Stanford University of the study of and experimentation in aeronautical engineering.

Experimental Work at Stanford

The grant provides in part a contribution for the development of equipment at Leland Stanford and in part provision for financial support for a period of ten years. In honor of the donor, whose gift has made possible this important development, the Stanford authorities plan to establish the Daniel Guggenheim Experimental Laboratory of Aerodynamics and Aeronautical Engineering.

The present aerodynamics laboratory in which experiments have been conducted for ten years, established for testing propeller models, will be developed and improved with the addition of equipment for tests to other parts of planes and will be housed in an adequate and commodious brick and concrete structure to take the place of the present temporary wooden building.

In addition, Stanford University will establish a full course for the training of young men in aerodynamics and aeronautic engineering. This course will be an extension of the present work of the University in aeronautics into a complete and well-rounded six-year course, to be organized at once as a division of the School of Engineering. The first four years will be occupied largely with a broad and general engineering training, while the final two years will be devoted to intensive training in the field of aerodynamics and aeronautical engineering. In this way it is planned to provide young men with the thorough scholastic training necessary to qualify them for effective service in the aircraft industry and air transportation activities, where there is promise of early and large development.

The Stanford campus is peculiarly suited for the establishment of a school of aeronautics through the large amount of available land for a flying field for experimental use with full-sized planes, and an adequate plot of ground has been held in reserve for this purpose. Furthermore, the location of the campus within a short distance of San Francisco Bay will make possible the development of a seaplane station and landing stage, whenever conditions make that desirable. These developments will place at Stanford facilities for research and practical demonstration in all types and forms of flying craft, both land and marine and in both model and full-scale size.

The work at Stanford will be organized along three general lines, covering the whole field, and each headed by an expert— (1) aerodynamics, (2) structural design and construction, and (3) laboratory research. The men in charge of the first two divisions are yet to be appointed. The laboratory will be directed by Professor E. P. Lesley, who has, for a decade, been associated with Dr. W. F. Durand in the work of the present laboratory, spending a year of that time in the Aerodynamic Laboratory of the National Advisory Committee for Aeronautics at Langley Field, Va.

It is expected that special attention will be given to research and the experimental study of problems connected with aeronautical engineering, and for these lines of work the laboratory with its enlarged facilities will be peculiarly well adapted. Building upon its past work of fourteen important investigations, the reports of which have been published by the National Advisory Committee for Aeronautics, a further series of investigations is now contemplated, dealing among other subjects further with the reaction between the airplane structure and the propeller, its character and amount, and the most effective dispositions for rendering such interference a minimum.

It is expected that other funds will be found by Leland Stanford University for a limited number of research fellowships, thus furnishing financial aid to specially qualified students while continuing their studies along research and advanced lines.

German Engineer to Visit U. S.

A further announcement is to the effect that Dr. von Karman of Aachen, Germany, one of the foremost mathematical physicists and one of the most out-standing aeronautical engineers of Europe, has accepted the invitation of the Daniel Guggenheim Fund to visit the aeronautical centers of this country in the near future. He will go immediately to Pasadena for the sake of advising the aeronautical staff of the Institution, both as to the best type of aeronautical installation and as to the design of new planes already being perfected there.

Aeronautical Clubs

The Daniel Guggenheim Fund for the Promotion of Aeronautics, Inc., wishes to maintain a full list of all Flying Clubs. Secretaries of such clubs are requested to forward their names and addresses to the Daniel Guggenheim Fund at 598 Madison Avenue, New York City.

Many Civilian Planes in National Air Races

AFTER SEVERAL months of preparation, everything has now been placed in readiness for the staging of what will, with little doubt, prove one of the greatest air meets the World has ever seen. The staging of the Sesqui-Contennial Exposition renders Philadelphia the most favorable place in the country for the holding of the 1926 National Air Races. As a result, not only of the attraction to be found in the Sesqui-Contennial but also of the tremendous public interest which has been created in aeronautics during the past year, record crowds are confidently expected. Furthermore, so many fliers and others of the aeronautical community have indicated their intention of being present at the Air Races that there is no doubt that Model Farms Field will prove to be a veritable rendezvous of the aviation world during the days Sept. 4 to 11. Mayor and Mrs. Kendrick of Philadelphia will attend the races the opening day and Governor Moore, of New Jersey, will be a guest on New Jersey Day, Sept. 8, when the feature of the day, the aerial acrobatics, will be judged by the South Jersey Aero Club. Edgar L. Bamberger, of Newark, has given the medal for this event.

It is expected that the aggregate number of Army, Navy and civilian planes present at Model Farms Field will be a record. Great care has been taken to lay out and equip the field to insure adequate facilities for the meet. The courses have been certified by the U. S. Coast and Geodetic Survey Dept., and the lighting system includes a giant B.B.T. floodlight, of five hundred million candle-power, and a B.B.T. 2½ sec. flashing beacon. Telephones have been installed and a seating capacity for 1,100 people has been provided. Two score boards, which will post instantly the record of events, have been erected and there will be a parking space for 10,000 cars.

Entertainment Features

Races, comedy events, and aerial gymnastics will be held daily during the afternoon. The parachute jumping contests, which will be held daily, are open to civilian as well as military entrants. The jump must be made from a minimum altitude of 1,500 ft., and landing be made at a designated point on the field. There will be a daily prize of $50 for this contest and at the end of the meet prizes of $900 will be awarded winners of the contest as a whole. Contestants are limited to one descent a day for the period of the races.

Participants in the On-to-Sesqui race will come from points as distant as California and Texas. The awarding of the trophy will be based on the average speed computed by the total elapsed time, the distance covered, passengers carried and engine horsepower. In addition to the Sesqui-Centennial Trophy, $4,000. in prizes will be awarded.

The races open at 1.45 p. m. on Saturday, Sept. 4. Event No. 1 is for low-powered airplanes piloted by civilians. This is one of three elimination races for the Aero Club of Pennsylvania Trophy and $1,500 in prizes. The second race is for the Independence Hall Trophy and $2,500. in prizes. Two. three or four place planes, piloted by civilians, are eligible to compete in this race.

Event No. 3, which will open the Labor Day (Monday, Sept. 6) program, will take place in the morning. This is a duration race for hand-launched model airplanes, propelled by rubber bands. The awards are the Mulvihill Model Trophy and $500. in cash. Event No. 4, for the B. B. T. Trophy, and No. 5, for the National Guard Trophy, offered by C. T. Ludington, will be held in the afternoon. No. 4 is a novelty relay race for commercial planes and No. 5 is a speed race. Only pilots and planes of the National Guard may compete in the latter event. The usual stunt flying, parachute jumping, smoke screen work, circus stunts and night flying will form the closing part of the Labor Day program.

On Tuesday, Sept. 7, Events No. 6, 7, and 8 will be held. No. 6 is a sport plane race for the Scientific American Trophy and $1,500 in prizes. Civilians only may compete. No. 7 is a race for light planes, with the Dayton Daily News Light Airplane Trophy as the award. No. 8 is a novelty relay race for commercial airplanes, for which the Benjamin Franklin Trophy, offered by Joseph A. Steinmetz, and $1,000. cash are the awards.

New Jersey Day, Wednesday, Sept. 8, will have Events No. 9, 10 and 11 as its features. The first is the second elimination contest for the Aero Club of Pennsylvania Trophy, the second is a speed and efficiency contest for civilians in light airplanes and the third is a light commercial speed and efficiency race. Prizes for Exent No. 10 include the Aero Digest Trophy, the Betsy Ross Trophy, donated by Jacob Reed's Sons, and $2,000. in cash. Event No. 11 will be a contest for the Aviation Town and Country Club of Detroit Trophy.

Events 12, 13 and 14 are scheduled for Thursday, Sept. 9. They are the final race for the Aero Club of Pennsylvania Trophy, the special contest for precision landing, for which the Valley Forge Trophy has been offered by Dr. Thomas E. Eldridge, and a race for observation type airplanes by military fliers, for the Liberty Engine Builders' Trophy. Awards to second, third and fourth place winners will also be made in this latter event.

On Friday, Sept. 10, the race for large capacity airplanes, competing for the Liberty Bell Trophy, offered by John Wanamaker, will be held and also the race for pursuit type planes, for pilots of the First Pursuit Group, U. S. Army Air Corps. The award for this event is the John L. Mitchell Trophy.

The closing day of the races, Saturday, Sept. 11, will have Events No. 17, a speed and efficiency race for civilians only for the Detroit News Air Transport Trophy, and No. 18, the free-for-all military pursuit race for the Kansas City Rotary Club Trophy, as its features.

The complete program of events is as follows:

Saturday, September 4
- Event No. 1—First Elimination for 510 cu. in. engines.
- No. 2—Free-for-all 800 cu. in. engines.

Monday, September 6
- Event No. 3—Model Race.
- No. 4—Relay Race No. 1.
- No. 5—National Guard Race.

Tuesday, September 7
- Event No. 6—Sport Plane Race—300 cu. in.
- No. 7—Light Airplane Race—80 cu. in.
- No. 8—Relay Race No. 2.

Wednesday, September 8
- Event No. 9—Second Elimination for 510 cu. in. engines.
- No. 10—Speed and Efficiency, Light Airplanes—80 cu. in.
- No. 11—Light Commercial—Speed and Efficiency—800 cu. in.

Thursday, September 9
- Event No. 12—Trophy Race for 510 cu. in. engines.
- No. 13—Precision Landing Contest.
- No. 14—Race for Observation Planes—Military.

Friday, September 10
- Event No. 15—Large Capacity Airplanes—Military.
- No. 16—Pursuit Race (First Pursuit Group)—Military.

Saturday, September 11
- Event No. 17—Air Transport Race—Civilians.
- No. 18—Free-for-all Pursuit Race—Military.

List of Entrants

A tentative list of entrants in the nineteen events of the National Air Races is given below. This list is not complete the official lists being still open at the time of AVIATION going to press.

Event A
Sesqui-Centennial Trophy

"On to the Sesqui" Race
(Civilians Only)

Name	*Address*	*Plane*
Beeler Blevins	Atlanta, Ga.	Waco 9 OX-5
D. Mackay Solenberger	Atlanta, Ga.	Waco 9 OX-5
Arthur K. Killips	Lyon, Ill.	Waco
Robertson Aircraft Corp.	Anglum, Mo.	Standard J1
Austin R. Lawrence	Dallas, Tex.	Curtiss JN-4C
Douglas H. Davis	Atlanta, Ga.	Waco 9
Mayer Aircraft Co.	Bridgeville, Pa.	Curtiss-Oriole C-6
Mayer Aircraft Co.	Bridgeville, Pa.	Waco 9 OX-5
Jos. A. Dunkel	Lakewood, Ohio	Standard Hisso
Ross Arnold	Fort Worth, Tex.	Curtiss TN4C
Wright Aeronautical Corp.	Paterson, N. J.	Wright-Bellanca WB-2
Harry J. W. Hiles	Gothenburg, Nebr.	Waco 9
George Faw	Clover Field, Santa Monica, Calif.	Special Built OX-5
Lloyd O. Yost	Conynham, Pa.	Waco 9

Event 1
First Elimination for Aero Club of Pennsylvania Trophy

Free-for-All Race for Two or More Place Low Powered Airplanes
(Civilians Only)

Name	*Address*	*Plane*
Ludington Exh. Corp.	Philadelphia, Pa.	Waco 9
Ludington Exh. Corp.	Philadelphia, Pa.	Waco 9
Basil L. Rowe	Keyport, N. J.	Thomas Morse
W. L. Gilmore	Meadville, Pa.	Thomas Morse OX-5
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Orio-Wing 1
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Orio-Wing 2
Lloyd O. Yost	Conynham, Pa.	Waco 9
Roswell Becker	Jackson, Mich.	Waco 9
Wm. H. Emery, Jr.	Bradford, Pa.	Travel Air OX-5
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air OX-5
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air OX-5
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air OX-5
Alexander Aircraft Co.	Denver, Colo.	Eaglerock OX-5
Kreider-Reisner Aircraft Co.	Hagerstown, Md.	Waco 9
Chas. C. Baugham	Philadelphia, Pa.	Waco 9
Mayer Aircraft Co.	Bridgeville, Pa.	Waco 9 OX-5
W. H. A. Boyd	Baltimore, Md.	Pop-Sons 3 Place Sport Monoplane

Event 2
"Independence Hall" Trophy

Free-for-all Race for Two, Three or Four Place Airplanes
(Civilians Only)

Name	*Address*	*Plane*
Mayer Aircraft Co.	Bridgeville, Pa.	Curtiss-Oriole C-6
Wright Aero. Corp.	Paterson, N. J.	Wright-Bellanca WB-2
Curtiss Flying Service, Inc.	Garden City, L. I., N. Y.	Curtiss Oriole
Basil L. Rowe	Keyport, N. J.	S.V.A.
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Sesqui-winged arrow
Chance Vought Corp.	Long Island City, N. Y.	Vought VO
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air Wright-E
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air Wright J4B
Curtiss Flying Service	Garden City, L. I., N. Y.	Oriole
Curtiss Flying Service	Garden City, L. I., N. Y.	Lark
Leonard W. Bonnoy	Flushing, L. I., N. Y.	Special Biplane Hrsp. 180
Leonard W. Bonnoy	Flushing, L. I., N. Y.	Bonnoy Cull Mono.

Event 3
Mulvihill Model Trophy

Duration Race for Model Airplanes

Name	*Address*	*Plane*
Merril C. Hamburg	Detroit, Mich.	Model
Merril C. Hamburg	Detroit, Mich.	Model
Merril C. Hamburg	Detroit, Mich.	Model
Elwood T. Anderson	Philadelphia, Pa.	Model
Warren H. Delancey	Springfield, Mass.	Model
Harold L. Laird	Chicago, Ill.	Model
Arthur O. Heinrich	Baldwin, L. I., N. Y.	Model
Bertram Pond	Peru, Ind.	Model
Desider Dayko	Perth Amboy, N. J.	Model
Soc. of Model Aero. Engineers, Eng.	Wembley, England	Model
Soc. of Model Aero. Engineers	Wembley, England	Model
Jos. J. Lucas	Chicago, Ill.	Model
Honore Somors	St. Louis, Mo.	Model
Christy C. MacGrath	St. Louis, Mo.	Model
Elmer G. Eckman	Philadelphia, Pa.	Model
Luther D. Bechtel	Haddonfield, N. J.	Model
Dominic de Stefano	Philadelphia, Pa.	Model
Elmer A. Wilson	Philadelphia, Pa.	Model
Orrin Heckman Anderson	Philadelphia, Pa.	Model

Event 4
"B.B.T." Trophy

Novelty Relay Race for Commercial Planes
(First Race)

Name	*Address*	*Plane*
Ludington Exh. Corp.	Philadelphia, Pa.	Waco 9

The Pioneer Company's Travel Air (Wright Whirlwind), winner of the Airplane Reliability Tour and which is entered in the National Air Races

A Vought UO-1 (Wright Whirlwind) of the type entered in the National Air Races. The machine at the Races will have one of the new Wright Whirlwind J-5 engines

Basil L. Rowe	Keyport, N. J.	Thomas Morse
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Orio-wing No. 1, No. 2 Sesqui-wing
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air OX-5

Event 5
"National Guard" Trophy

Speed Race for National Guard Pilots and Planes

Pennsylvania National Guard	Lt. George N. Hyland	JNS
	Maj. John S. Owens	JNS
	Lt. George R. Dickens	JNS
	Lt. Jos. J. Gallagher	JNS
	Lt. Lawrence W. Helweg	JNS
	Capt. John J. Quinn	JNS
	Lt. George Logan	JNS
N. Y. National Guard, Miller Field, Staten Island, N. Y.	Carl W. Rach	JN-4
	Capt. Lawrence G. Brower	JN-4
	Lt. Carl J. Sack	JN-4
	Lt. Edwin Weatherdon	JN-4
	Lt. Leonard F. Long	JN-4
Leonard F. Long	Brooklyn, N. Y.	Curtiss JN4H

Event 6
"Scientific American" Trophy

Sport Plane Race
(Civilians Only)

Name	*Address*	*Plane*
W. H. A. Boyd	Baltimore, Md.	Pop-Sons 3 Place
Heath Airplane Co.	Chicago, Ill.	Heath Tomboy
Kreider-Reisner Aircraft Co.	Hagerstown, Md.	Meyers-Midget
Kreider-Reisner Aircraft Co.	Hagerstown, Md.	K.R.A. Racer

Event 7
Dayton Daily News Light Airplane Trophy

Race for Light Airplanes
(Civilians Only)

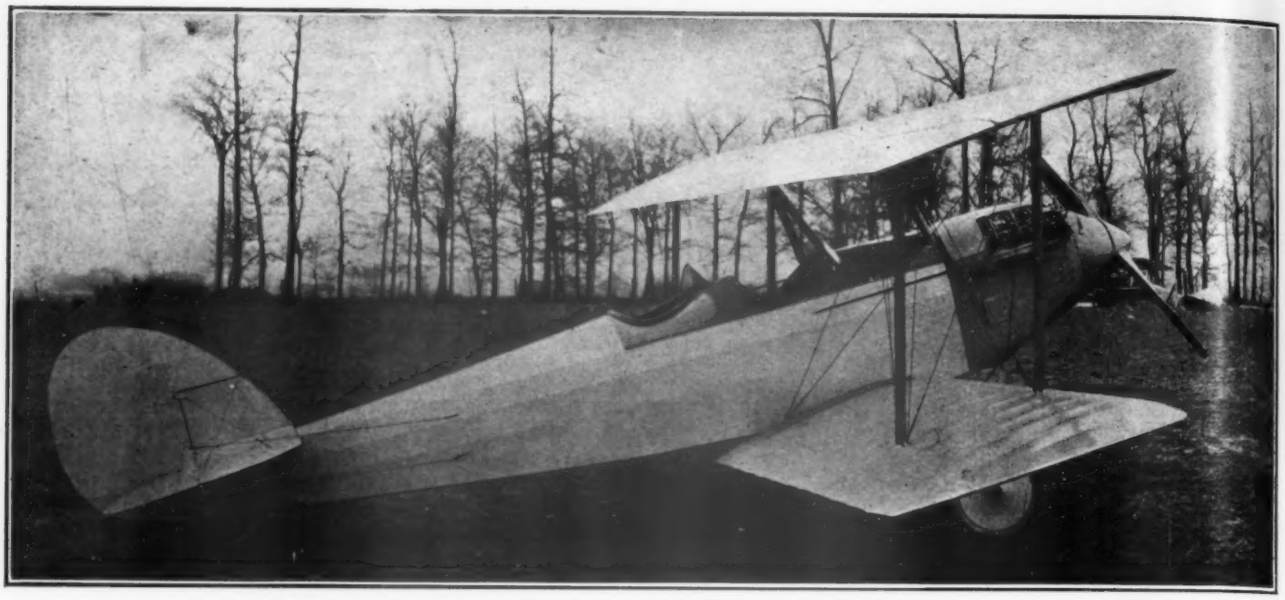
Name	*Address*	*Plane*
Heath Airplane Co.	Chicago, Ill.	Heath Tomboy
Kreider-Reisner Aircraft Co.	Hagerstown, Md.	Meyers Midget
Kreider-Reisner Aircraft Co.	Hagerstown, Md.	K.R.A. Racer

Event 8
"Benjamin Franklin" Trophy

Novelty Relay Race for Commercial Airplanes
(Civilians Only)

Name	*Address*	*Plane*
Ludington Exh. Corp.	Philadelphia, Pa.	Waco 9
Basil L. Rowe	Keyport, N. J.	Thomas Morse
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Orio-wing No. 1, 2 Sesqui-wing
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air, OX5

Another view of the Vought UO-1 of the type entered in the National Air Races



The Waco 9 (Curtiss OX-5), a number of which are entered in the Air Races.

Event 9
Second Elimination for Aero Club of Pennsylvania, Trophy

Free-for-All Race for two or More Place Low Powered Airplanes
(Civilians Only)

Event 10
"Aero Digest" and "Betsy Ross" Trophies

Speed and Efficiency Race for Light Airplanes
(Civilians Only)

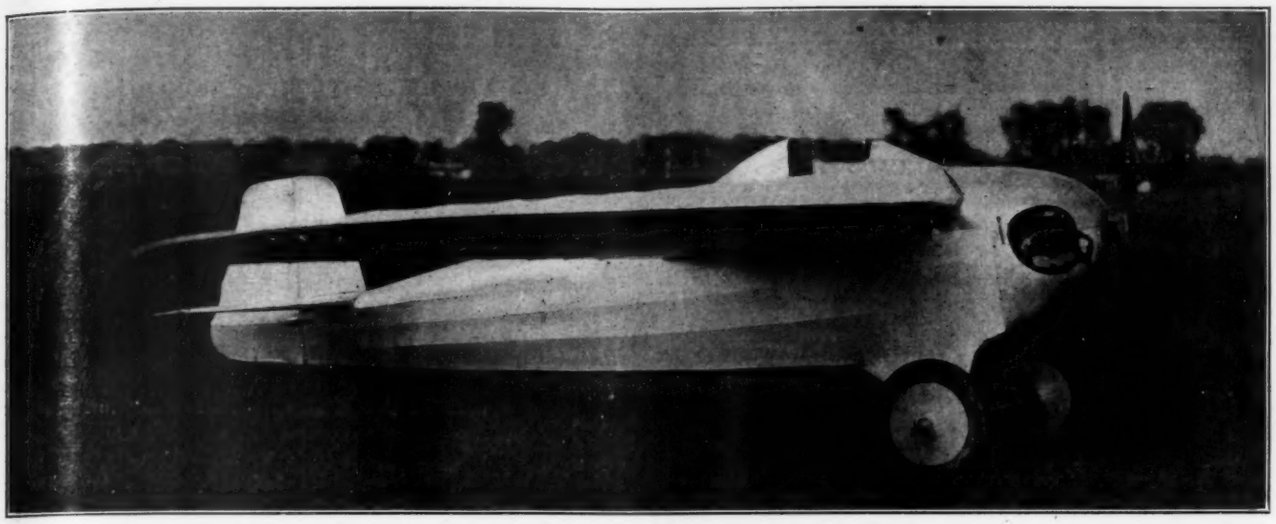
Name	*Address*	*Plane*
Heath Airplane Co.	Chicago, Ill.	Heath Tomboy
Kreider-Reisner Aircraft Co.	Hagerstown, Md.	K.R.A. Racer
Kreider-Reisner Aircraft Co.	Hagerstown, Md.	Meyers Midget

Event 11
Aviation Town and Country Club of Detroit Trophy

Light Commercial Speed and Efficiency Race
(Civilians Only)

Name	*Address*	*Plane*
Mayer Aircraft Co.	Bridgeville, Pa.	Curtiss-Oriole, C-6
Wright Aero Corp.	Paterson, N. J.	Wright-Bellanca W-B 2
Curtiss Flying Serv., Inc.	Garden City, L. I., N. Y.	Curtiss Oriole
Basil L. Rowe	Keyport, N. J.	S.V.A.
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Sesqui-winged arrow
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Fleetwing No. 2
Chance Vought Corp.	Long Island City, N. Y.	Vought VO
Lloyd O. Yost	Conynham, Pa.	Waco 9
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air Wright-E
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air Wright J4B
Alexander Aircraft Co.	Denver, Colo.	Eaglerock, OX5
Leonard W. Bonnoy	Flushing, L. I., N. Y.	Bonnoy Cull Mono.
Kreider-Reisner Aircraft Co.	Hagerstown, Md.	Waco 9

The Pitcairn Orowing (Curtiss OX-5, 90 hp.) which will be at Model Farms Field, Pa. Harold F. Pitcairn standing by the plane.



The Heath Tomboy (Bristol Cherub, 30 hp.) which is entered in the lightplane races.

Event 12
Aero Club of Pennsylvania Trophy
Free-for-All Race for Two or More Place Low Powered Airplanes
(Civilians Only)

Event 13
"Valley Forge" Trophy
Special Contest-Precision Landing
(Civilians Only)

Name	*Address*	*Plane*
Mayer Aircraft Co.	Bridgeville, Pa.	Waco 9 OX-5
Basil L. Rowe	Keyport, N. J.	S.V.A.
George Faw	Santa Monica, Calif.	Special built OX-5
Ludington Exh. Corp.	Philadelphia, Pa.	Farman
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Orio Wing No. 1
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Orio Wing No. 2
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Waco 9
Pitcairn Aviation, Inc.	Philadelphia, Pa.	Waco 9
Lloyd O. Yost	Conynham, Pa.	Waco 9
Roswell Becker	Jackson, Mich.	Waco 9
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air Wright-E
Travel Air Mfg. Co.	Wichita, Kans.	Travel Air-Wright J4B
Alexander Aircraft Co.	Denver, Colo.	Eaglerock OX-5

Event 14
Liberty Engine Builders' Trophy
Race for Observation Type (two-place) Airplanes
(Military Only)

U. S. Navy	Lt. G. T. Owens	DH Special
	Lt. Arthur Gavin	NO-2
	Lt. John Farnsworth	OL-3
	Lt. E. W. Litch	UO-1
	Lt. (jg.) D. Cornwell	DH-4B

Event 15
"Liberty Bell" Trophy
Race for Large Capacity Airplanes

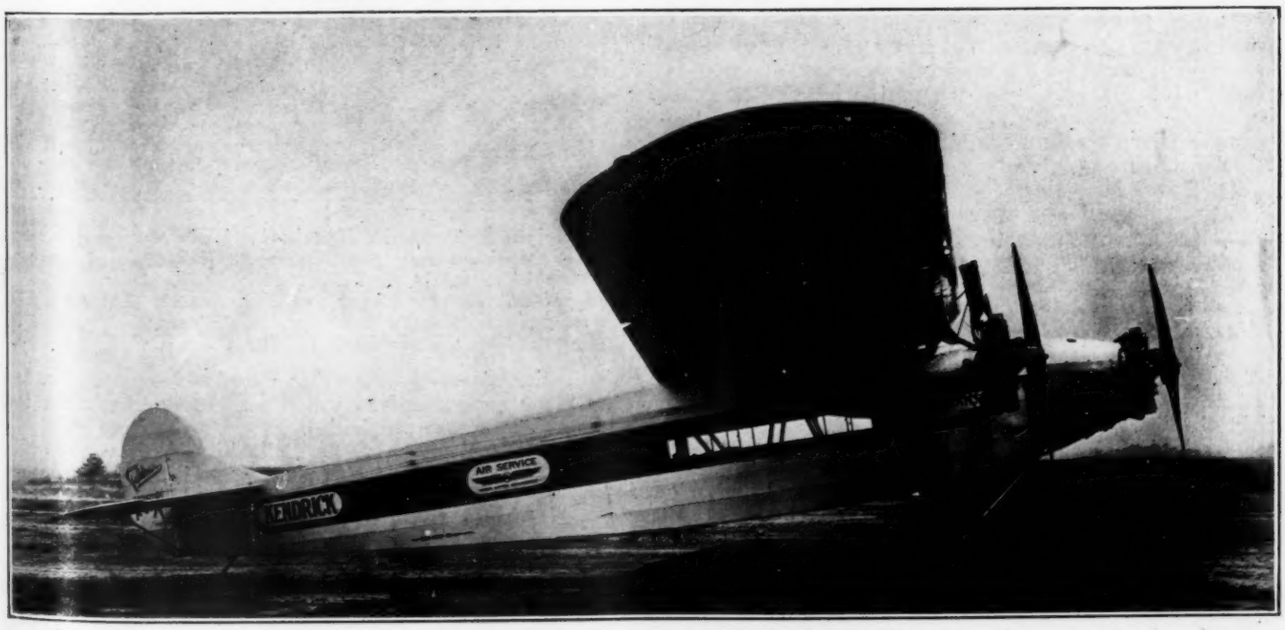
Event 16
John L. Mitchell Trophy
Race for Pursuit Type Planes
(Closed Event for Pilots of the First Pursuit Group)

Event 17
Detroit News Air Transport Trophy
Air Transport Speed and Efficiency Race
(Civilians Only)

Name	*Address*	*Plane*
Wright Aero Corp.	Paterson, N. J.	Wright-Bellanca WB-2

Event 18
Kansas City Rotary Club Trophy
Free-for-all Military Pursuit Ship Race

U. S. Navy	Lt. J. D. Barner	F6C-1
	Lt. G. T. Cuddihy	FB-3
	Lt. C. C. Champion	F3W-1
	Lt. W. G. Tomlinson	FB-6
U.S.M.C.	Lt. L. H. M. Sanderson	FB-3
	Lt. W. L. Kitterick	FB-1
	Master Tech. Serg. B. F. Belcher	FB-1



One of the P.R.T. planes (Fokker F-7, three Wright Whirlwind engines) of the Washington-Philadelphia Air Service, which undoubtedly will carry many passengers to the Air Races from Washington, D. C.

Navigating the Airplane Reliability Tour

Importance of Navigation Emphasized in Connection with the Winning of the Reliability Tour.

By BRICE H. GOLDSBOROUGH

IN MOST cross-country flights even an experienced pilot, unless he is very famliar with the ground he is flying over, is apt to follow a railroad or some main highway in order that he may not get lost. This often means a considerable detour and even at that the pilot may lose his way. The flight of the Travel Air piloted by Walter Beach in the Commercial Airplane Reliability Tour demonstrated that, with the proper instruments and a good map, a plane can be flown cross-country by the shortest route and never go off its course, and it is generally admitted that the almost perfect course flown by Beach had a good deal to do with his winning of the Tour.

Keeping on the course in cross-country flying is not as difficult as it is often made out to be, and the advance preparation and care which it requires is certainly worthwhile in saving time and the possiblity of an emergency landing due to being lost. The method used by the winner of the Reliability Tour was tried out and perfected by Charles H. Colvin of the Pioneer Instrument Co., who, last Spring, flew from Wichita, Kan., to New York in a Travel Air piloted by George A. Wies, Jr. The ground work consisted of a careful study of the map and the figuring out of the true compass course which would have to be flown. Ten mile distance points were marked off along the line of the course, and prominent land marks noted. The drift which would be caused by the wind was estimated before leaving the ground and the proper allowance made on the compass reading. A prominent point nearby was chosen to check the calculated heading and the necessary difference between the map course and the actual heading was established almost at the beginning of the flight.

Valuable Checks

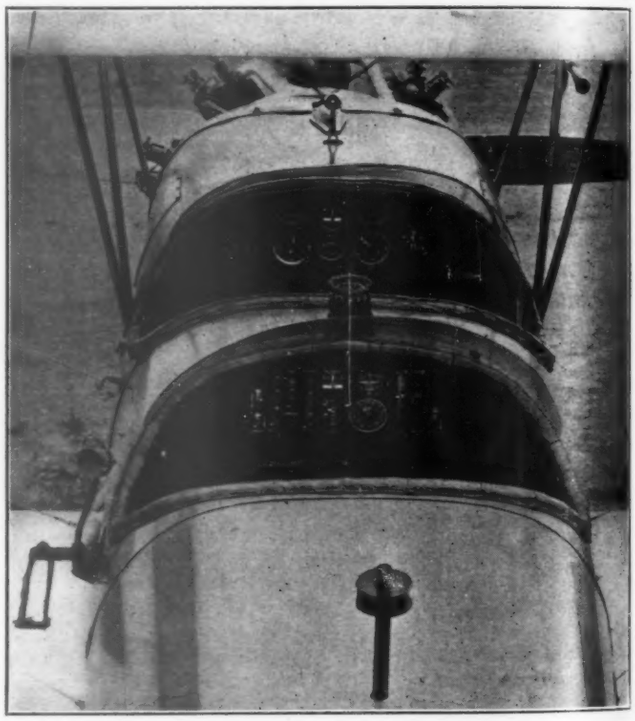
The circles which had previously been put on the map to indicate "sure-fire" land marks were used to check whether the correct course was being flown. What constitutes a "sure-fire" land mark depends to a large extent on the nature of the ground flown over. Except near a big city a junction point of two railroads is valuable. In mountainous countries automobile roads are useful. Lakes are also excellent except in a country where they abound. Sharp bends in rivers are also "sure-fire" land marks, but many of the small streams shown on maps either dry up in Summer or cannot be seen from the air. Especially in the prairie country there may be stretches of 50 or 60 miles where there are absolutely no "sure-fire" land marks. In this case especial care must be taken that the proper compass course is followed.

The Travel Air which Walter Beach flew is owned by the Pioneer Instrument Co., and contains a very complete set of instruments, which made possible the absolute accuracy of the course. However, a good pilot can, to a considerable extent, use the same methods in cross-country flying with just the use of a compass and a good map.

The instruments used most in the Tour were the earth inductor compass, the drift indicator and the air log. The navigator set the course with the earth inductor compass controller so that the indicator read zero when the airplane flew in the right direction. As soon as the pilot got off his predetermined course, the instrument indicated either to the right or to the left. The drift indicator which was attached to a bracket on the outside of the plane enabled the navigator to check the force and direction of the wind and the resultant ground speed and direction of travel of the plane. It consists of a vane with a sight-wire and an eyepiece. Adjustment is made for the altitude of the plane, and when looking through the eyepiece the distance sighted on the ground between the two cross-wires is always exactly one mile. The navigator spots an object crossing the front wire, starts his stop-watch and stops it when the object has crossed the rear wire. The stop-watch is graduated to read miles per hour, so that no calculating need be done to get the forward speed relative to the ground. The same method is used to determine lateral drift. If the drift was found to have changed since the last reading the proper change in course was made on the earth inductor compass, this change being either adding or subtracting a certain number of degrees to the true course, making an apparent course flown either to the right or left of the actual course. All Beach had to do was to keep his eye on "nothing" and he was assured of flying straight.

Drift and the Air Log

The air log reported the distance traveled through the air and was used as a check on the other instruments. By making the proper compensation for the drift, the navigator would notify Beach some three-quarters of an hour before reaching the destination at exactly what time the plane would arrive, and the plane always arrived within an error of less than two minutes of the time prophesied.



The cockpits of the winning Travel Air, showing the complete set of Pioneer instruments which played so important a part in the navigation of the plane throughout the Tour. As will be seen, the rear cockpit is equipped with the new Pioneer vertical instruments. The short pillar in the foreground, on the turtle back of the fuselage is part of the Pioneer Earth Inductor Compass.

The system used during the Reliability Tour cannot really be termed pure navigating but rather a scientific use of maps with the help of accurate instruments. There were several instances which demonstrated the value of the method used. In most parts of the West the section lines run North and South and East and West and are used by pilots in setting their course. However, there are several sections where the lines do not follow the true meridians and had it not been for the fact that there were three compasses in the plane it would have been impossible to persuade Beach that the correct course was being followed.

The Travel Air plane, due to the dispatching system, usually started off last. By the time that it had caught up with the other planes they were often scattered over a ten mile front, indicating that many of the pilots must have been well off their course. After the first few legs, the other pilots caught on that the Travel Air was flying an exceptionally straight course, and it was noted that, as it caught up to the other planes, they generally converged and followed the plane which was using accurate instruments and really reading the map.

It has been said that "navigation won the tour" but it must be remembered that it was the well nigh perfect performance of both the Travel Air plane and its Wright Whirlwind engine which made the navigation of value.

Commander John Rodgers, U.S.N.

It is with the very deepest regret that it becomes necessary to report the death of Comdr. John Rodgers, U.S.N., who was killed while flying from Washington, D. C. to the Naval Aircraft Factory, Philadelphia, Pa., on Aug. 27. Commander Rodgers left Washington in a Vought UO-1, with Aviation Machinist Mate Samuel Schultz. It was his object to fly to the Naval Aircraft Factory with a view to inspecting the new PN-10 flying boats which are under construction there and

Commdr. John Rodgers

which are to be employed in the Pacific Coast patrol squadron which was to be under the command of Commander Rodgers. The flight to Philadelphia was uneventful, the plane and engine being in perfect condition but, when approaching Mustin Field, Philadelphia, to land, the machine apparently lost flying speed at a low altitude, owing very probably to the unusually dead calm which prevailed, and fell into the shallow water of the Delaware River. Commander Rodgers, who was in the forward cockpit and sustained bad injuries owing to being crushed under the engine, was taken out after much difficulty and died later in the hospital. Samuel Schultz, his mechanic, was also seriously injured and was taken to the hospital in a critical state.

Commander Rodgers, the son of Rear Admiral John A. Rodgers, U.S.N. retired, was born in 1881 and educated at the United States Naval Academy at Annapolis. He went to sea in 1905 on the U.S.S. Destroyer Lawrence and later served on the Battleship Nebraska and the U.S.S. Hull, until, in 1908, he was commissioned a lieutenant. From 1909 to 1910, he served on the U.S.S. St. Louis and the U.S.S. Pennsylvania. In 1911, he was ordered to Dayton, O. to "confer with the Wright Brothers for instruction in the art of aviation" and was the second naval officer to take up aviation duty. In August, 1911, he went to the Naval Academy for aviation duty and in December, 1911, established the Naval Air Station at San Diego, Calif., returning from May to August, 1912, to the Naval Academy for aviation duty. He concluded 1912 by going to sea with the U.S.S. Illinois and stayed at sea until 1915 with the U.S.S. Nebraska and U.S.S. Paducah, transferring then to submarine duty. In 1916, John Rodgers was promoted to lieutenant commander and returned to aviation duty in January 1918. Taking up sea duty again, Commander Rodgers commanded Division Ten, Submarine Forces, with the U. S. Fleet in December, 1918 and in 1919 became executive officer, U.S.S. Nevada, later in the year being promoted to the rank of commander. In June 1921, Commander Rodgers became recruiting officer, Baltimore, Md.

Returning to aviation duty again in 1922, Commander Rodgers took command of the Naval Air Station, Pearl Harbor, Hawaii and in 1925 commanded the U.S.S. Wright, aircraft tender with the Aircraft Squadron, Scouting Fleet. It will be remembered that Commander Rodgers was senior officer of the Navy's West Coast to Hawaii flight last year when the seaplanes, PN-9 No. 1, PN-9 No. 2 and PB-1, were to make the flight. The PN-9 No. 1, under the command of Commander Rodgers, was, it will be recalled, the only one of the three actually to make real progress on the flight, the PB-1 not starting and the PN-9 No. 2 being forced down within 200 miles of the California coast. Commander Rodgers' plane was forced down 450 miles from the Hawaiian coast owing to running out of fuel and he and his four companions were adrift on the Pacific Ocean for nine days before they were found, having by then, through skilled seamanship, sailed the flying boat on the surface to within sight of land.

On returning to the United States after this experience, Commander Rodgers became Assistant Chief of the Bureau of Aeronautics, but, a few weeks ago, at his own request, he was transferred to air duty, and, as already mentioned was to have commanded the Coastal Patrol Squadron consisting of PN-10's which is shortly to be formed on the West Coast.

The sudden and unexpected death of Comdr. John Rodgers is a serious loss to the Navy and to the country. He was one of the leading authorities on aeronautics in the Navy and a great believer in the value of naval aviation.

Navy Orders Metal-Clad Airship

The Navy department recently awarded the contract for the construction of a metal-clad airship, provided for in recent Congressional legislation, to the Aircraft Development Corp., of Detroit, Mich. It is understood that the ship is to be delivered to the Naval Air Station, Lakehurst, N. J. within 400 days.

The Aircraft Development Corporation has long been engaged in the experimental work entailed in the development of a metal-clad airship under the direction of Ralph H. Upson, chief engineer of the company. The airship is intended to be an experimental production in order that the principles involved in metal-clad construction may be practically tried out. The ship will be 150 ft. long with a maximum diameter of 53 ft. and a cubic capacity of 200,000 cu. ft. The airship is to be filled with hydrogen and it is expected it will have a cruising range of 2,200 miles. Using helium in the envelop would reduce this range to 1,200 miles. The airship is to have two engines developing 200 hp. each. A crew of four will be carried while accommodation for eight passengers is to be provided for.

The Aircraft Development Corp. has recently published its Annual Report for the year July 1, 1925 to June 30, 1926. It is a most interesting publication covering, in twenty-three pages, a complete account of the activities of the company during the past year. Naturally the report deals in the main with airship development and much space is devoted to the proposal leading to the contract with the Navy for the metal-clad airship. The history of the company is very interestingly brought out in the section on engineering progress in which the materialization of Ralph Upson's extensive work on the possibilities of metal-clad airship construction is characterized.

Some Problems in the Design of an Air-Cooled Radial Engine

By ROBERT W. A. BREWER
Pitcairn Aviation, Inc.

WHEN ONE is confronted with a new design or product, the natural tendency is to criticise it from ones own viewpoint at the moment, regardless of what might have been the object of the designer. Thus, frequently a wrong conception arises in the mind of the critic, who may, incidentally, be a prospective purchaser of the product.

For this reason it will be helpful to consider briefly some of the problems which confront the designer of what has proved to be a very attractive type of airplane engine, namely, the air-cooled radial.

The designer of an air-cooled radial engine for commercial use must decide where his probable market lies. He must study carefully the present production needs and the future trend of development. Together with those aeronautical designers and backers who are open to confer upon the subject a decision will be arrived at as to the general objects such as:

Brake horsepower; speed of revolution; cooling and cowling; weight; number of cylinders; disposition of accessories; lubrication and fuel arrangement; the kind of fuel to be used; mounting, type and arrangement; the selling price of the complete engine; and does this include a starter.

Cost, the Controlling Factor

These few main headings provide the designer with much material for a start. He will then probably base his first conclusions upon what can be done for the cost at which the job can be produced. This item, though last on the above list is the overshadowing influence in the problems to be met. This question of costs predominates throughout every consideration.

We are now working down to a cost basis and it is the engineer's problem to produce his best results at a minimum figure to the purchaser. The critic must look upon the finished product through spectacles of "Low Cost" and temper his criticism with the mindfulness of comparatively small production volume. Further, he must realize that certain standard and desirable forms of accessories must be purchased by the engine maker at "aviation prices". This cuts down considerably the figure of allowable cost of the engine alone. As an example, a proposition may be submitted concerning a low priced engine design to include many desirable features, but the cost of these accessories would almost amount to the total permissible cost of the job. So, one can readily understand that the minimum of cost is very definitely determined, irrespective of the size of the engine.

We must therefore, choose a size in which the cost of the accessories is not overwhelming in relation to the total. Let us take the brake horsepower as having a value of x and this is to be developed at of N revolutions per minute with a direct drive. The next consideration is the kind of fuel to be used and, for commercial work, we will assume, perhaps rightly so, that commercial gasoline should be the fuel. This will require us to make some sacrifice in the power-for-size output of the engine, but this is warranted in view of the ultimate object. The engine must operate economically with the cheapest fuel that can be bought for the purpose. The fuel question limits the compression ratio desirable so let this be 4.5 to 1. The details of design will determine the brake mean effective pressure obtained with such proportions, the compression pressure will depend upon many details of the induction system and the valves and may vary between limits as far as 15 lb. per sq. in. apart. The brake mean effective pressure will also depend upon the efficacy of the cooling of the cylinder head, pistons and valves so that for maximum output, all these factors must be carefully worked out.

A problem of major importance in a radial engine is that of the distribution of the explosive mixture to the cylinders, and although this is very vital in all engines, it is practicularly difficult in a radial. Any student of radial engines will be acquainted with certain forms of manifolds, duplex, triplex and spiral, which are in use, but the great point is to keep fuel from settling in the lower parts of the manifolds and to deliver it in equal quantity to the upper parts.

This can be done satisfactorily by simple means, as has been demonstrated, and the fuel intimately mixed with the air during the process. Economy and absence of fire risk are two benefits derived from such a method, irrespective of the resulting equality of explosion torque.

The positions of the spark plugs require nice arrangement but the designer is much limited in this respect.

Cylinder Capacity

How, now is the volumetric displacement of the engine to be disposed? First we will make a conservative estimate of its magnitude based upon the performance of similar engines. Divide this up into trial numbers representing possible numbers of cylinders which can be used. In conventional types of air-cooled radials, this number will be odd and limited to 5, 7 or 9 we will neglect 3 as such a number is not usually satisfactory except for quite small engines.

The stroke-bore ratio may have many values and here comes a major problem to solve, what shall it be?

Generally speaking, the desirable feature is to provide as much cylinder bore circumferentially as can be crowded round the crank case. This is limited by piston interference. It will be necessary to make several trial layouts so that this interference can be avoided and at the same time holding the overall diameter of the engine in its complete form within desirable limits. This overall dimension is also governed by the angle of the valves and by the size and type of springs used.

The angle of the valves is in turn governed by the diameter required or rather the ratio of the diameter of a valve to that of the cylinder.

As usually some compromises have to be made, and although it is better to keep the valve gear truly radial from the mechanical standpoint, this adds to the overall diameter of the complete engine. On the other hand, some change of direction of the motion involves side thrusts on certain parts, either rockers or tappets, which must be suitably designed to cope with the loads imposed upon them.

Connecting Rod Assembly

The ratio of length of connecting rod to crank is fixed within certain limits so that the skeleton scheme is now complete. How shall the connecting rod assembly be made? There are two general classifications in common practice, the divided big end of the master rod with a one piece crank; the solid big end with a two piece crank. In the former, a one piece crank case can be used, thus avoiding a circumferential joint at the center. In the latter, this is practically a necessity if a bench assembly of the rods is desired. There are adherents of both lines of development and arguments pro and con regarding both. It is possible to make a lighter big end of the single eye type but this is accompanied by the features of the divided crank case and the divided crank, adding cost to the work. Some divided jobs suffer from leakage of oil, faulty and non-interchangeable fitting and crank trouble.

Mechanically, it is quite feasible to make a single overhung crank of sufficient strength and stiffness and with it to provide a second forward bearing for the propeller support. The rear part of the crank then forms a medium for driving

the accessories only. This means three bearings on the crank assembly. For cheapness and in order to obtain a two bearing crank it would seem inadvisable to use a divided crank as so much depends upon the proper fitting of the sleeve or coupling holding the two parts of the crank together. In the past, failures have resulted here.

Crank Pin Location Problems

Supposing a divided master rod is decided upon, a very nice problem arises as to the location of the link pins. Owing to the peculiar motion of the subsidiary rods, a careful study must be made of the positions of the pistons at various angular positions of the crank pin. The pistons should all come to the proper top center at the proper angular interval passed through by the crank pin. These positions should be laid out and it will be found that the correct locations of the link pins fall in a group which crowds them together opposite the master rod.

Another arrangement is possible where the pins are equally spaced, but this requires departure from standard uniform dimensions of parts. This alternative for a commercial engine is not desirable as one of the main attractions of the radial is the similarity and simplicity of its components.

Piston design is governed by the space available and freedom from interference of the piston skirts with one another and with the balance weights. Clearance from certain link rods must also be watched not only for the pistons but also for the cylinder barrels. These latter generally have to be cut away to permit the link rods to swing. The clearance in the cylinders opposite the master rod has to be the greatest depth. For the reason that the master rod must be stronger and wider, than the link rods, its width governs the width of the clearance slots in the cylinder barrels.

Balance

The question of balance is one requiring much care. Static balance can be arrived at by the conventional method but this does not relieve the load on the crank pin. The Bristol Company's system, as employed in the Jupiter engine, is very neat. There may be other schemes by which this loading may be relieved. Crank pin loading is one of the limiting factors of the radial engine as regards output for size. Whereas piston design for the "in line" engine type must provide for piston side thrust, this is of equal magnitude in all cylinders.

Radial engines offer the problem of variable thrust due, not only to the different obliquity of the link rods, but to the inter-disposition of thrusts in the system of connecting rods. This is brought out very clearly in an analysis of stress, contained in the McCook Field Report 2504 from which is taken the following table:

Piston Side Pressures. Pounds per square inch.

Cylinder	During power stroke maximum	mean
1	119	88
2	82	63
3	89	72
4	106	85
5	131	95
6	154	103
7	159	97
8	147	85
9	118	73
1 on notched side	136	90

No. 1 is the master rod cylinder.

Comparing the magnitude of this thrust with "in line" engines we find, for the Liberty 12 cylinder engine, a maximum of 52.5 lb. per sq. in. and a mean of 43.2 lb. per sq. in. during the power stroke.

These figures show that the side areas for pistons for radials should be as large as possible to keep the intensity of stress within practical limits. In the particular engine analized, the magnitude of the side thrust on the piston carrying the master rod varied from plus 1520 lb. at 80 deg. crank angle to minus 1508 lb. at 260 deg. crank angle. This was for a cylinder of 5⅝ in. bore.

Piston weight must be kept down to limit the inertia forces as these govern the design of the link rod ends. The problem is to accommodate on the big end of the master rod a group of link pins and rod ends, which have freedom of movement and yet are spaced as closely as possible to the center of the crank pin. There must be a sufficient factor of safety, proper bearing area and provision for lubrication.

The inertia force to be provided for can be found:

$F_i = 0.0000\,284 \times W \times r \times N^2 \times f_a$

where F_i = the inertia force

W = the weight of the reciprocating part in lbs.

r = the radius of the crank arm in inches

N = the revolutions per minute

f_a = the acceleration factor which has values as follows for the usual engine proportions:

at top center —1.273	120 deg. after —0.637
20 deg. after —1.149	160 deg. after —0.731
60 deg. after —0.863	180 deg. after —0.727

In designs where equal angular spacing of the link pins is resorted to, there will result a variation of piston position with equal angular displacement of the crank pin which amounts to as much as 12 deg. This means that the timing of the ignition and other functions may, and probably will, vary by this amount.

Materials

Cylinder design and material have been passed over until now, not because of its relative importance but mainly because the question of cost imposes limitations. In such an engine as we have under analysis, cast iron cylinders have practically no alternative. We must be prepared to carry a little additional weight in order to save a large cost. Cast iron cylinders of a useful commercial size weigh under 18 lb. each complete with heads, valve pockets flanges and cooling ribs. Similar cylinders without heads come out at 10 lb., so that by the time aluminum alloy heads are fitted, with valve seats, ports, etc., the saving of weight is very small and the additional cost is high. Practically, therefore, the cast iron cylinder complete must be used.

In designing this part, the foundry and air-cooling problems predominate and these are too wide to be included in the space of this article.

Manifolding of the exhaust gases leaves open a field for ingenuity as the cost of pipe bending work is very high. This also applies to the matter of the inlet pipes.

Position of Accessories

There is a difference of opinion regarding the mounting of the accessories in a purely commercial engine, on one hand there is the desire for magnetos on the nose of the crank case so as to give certain accessibility. This involves cowling which might otherwise be dispensed with. Others prefer the accessories at the rear of the engine, which introduces some difficulty in drawing the complete assembly through the mounting ring.

For commercial work, a starter should be provided. This should be cheap and simple, hand operated for preference. It is possible to combine such a unit with the rear assembly, adding somewhat to the total length of the engine.

Regarding magnetos it is just a moot point as to whether two are needed. The magneto is probably as reliable as any other part of the engine and plug trouble might well be met by a single magneto operating two independent sets of plugs.

These few problems give some indication as to why the designer has done certain things that may seem crude or weird in the eyes of the critic.

N.Y.U. Offers Evening Aeronautic Courses

The evening engineering division of the New York University will offer two courses in aeronautics during the coming academic year. In the first term, from October to February, a course will be given in the elements of aerodynamics and airplane design, comprising fifteen two-hour lectures every Monday evening. In the second term, from February to May, a course of fifteen two-hour lectures will be given in industrial aviation.

Those interested in these courses may obtain further particulars from the director of the evening engineering courses, New York University, University Heights, New York City.

Curtiss Falcon Plane Revised

Changes Result in Improved Serviceability and Even Better Performance.

THE CURTISS Aeroplane and Motor Company has recently delivered a revised O-1 Falcon observation airplane to the Army Air Corps and the airplane is now at McCook Field undergoing test. The Falcon was described in the issue of AVIATION of July 19.

and windshield for the observer's cockpit, resulting in greatly improved vision and making the Falcon much easier to fly from the rear seat than other observation types.

Other changes include a re-design of the rear seat to accommodate either seat or lap-type parachute, addition of a

The revised Curtiss Falcon O-1 observation plane (Liberty 400 hp.)

In the revised machine the observer's cockpit has been made considerably deeper, thus protecting the observer from the slipstream and increasing the accuracy of his gunnery. The underslung fuel tank, formerly used as an auxiliary has been made permanent, and faired so as to carry out the lines of the deeper fuselage. It is interesting to note that, in spite of this increased depth, the lines have been so carefully worked out that the high speed of the machine has actually been increased.

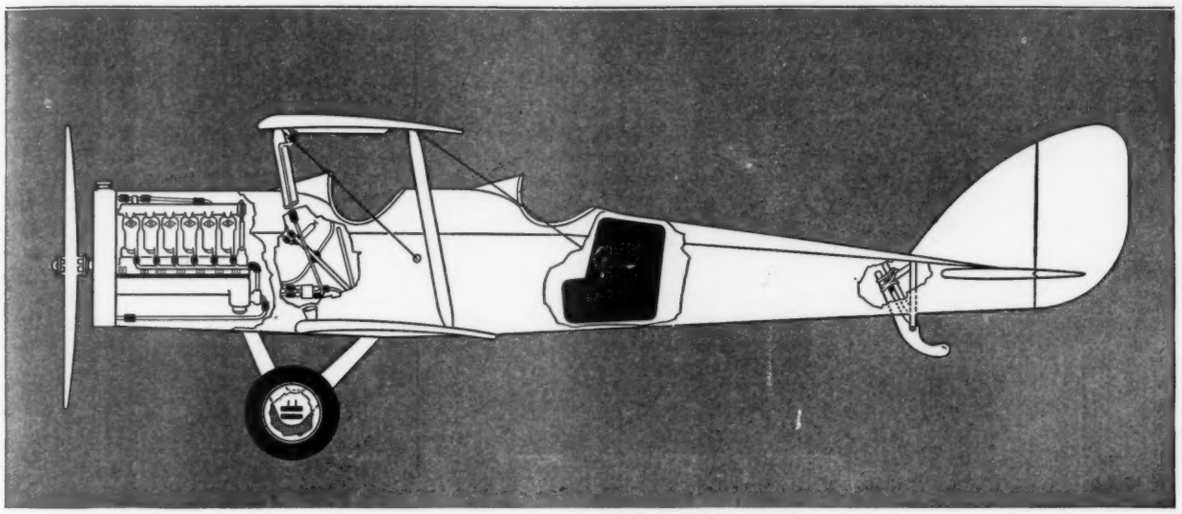
Another improvement consists of changes in the cowling

large luggage compartment, installation of mechanic's steps on the engine mounting and minor changes in the location of instruments and accessories.

All of these changes have been made as a result of the recommendations of Air Corps personnel, who have been flying the first consignment of Falcons during the past few months. From present indications the revised machine will further enhance the popularity of the Falcon type, which has been steadily gaining favor with the flying personnel of the Air Corps.

Another view of the Curtiss Falcon (Liberty 400 hp.). Note the increased depth of fuselage incorporating the additional gasoline tank just aft of the tunnel type radiator.

GOODYEAR PROVIDES THE RUBBER



BLACK areas show where rubber is used in airplane construction. Goodyear makes hose and molded rubber connections; tires, tubes and flaps; streamline windshields; fuel tank covers; tail skid and axle bumpers; grommets; rubber floor matting

FLAWLESS metal . . . true wood . . . stout fabric . . . and *good rubber!* These make the airplane.

Rubber tires, of course. As big as they must be. As small as possible to reduce resistance. Tough, yet light. Able to take the terrific smash of fast, or awkward landing. Able to roll to the takeoff over soft or bumpy ground. Not just tires, but *airplane tires.*

Fuel tank covers, too, that prevent splash or spray, even though the container be battered, broken, or pierced. A perfect bandage of soft, live rubber that protects against condensation, as well as accident.

Rubber washers, rubber grommets, rubber hose—to resist wear, absorb vibration, defy corrosion, or withstand extreme temperatures.

Now, the weight, texture and character of rubber must differ according to its purpose. It takes men who know rubber to make airplane equipment that will give the longest and safest service.

Goodyear makes everything in rubber for the airplane.

Aeronautics Department

THE GOODYEAR TIRE & RUBBER COMPANY, INC., AKRON, OHIO

GOODYEAR

Copyright 1926, by The Goodyear Tire & Rubber Co., Inc.

AVIATION EQUIPMENT

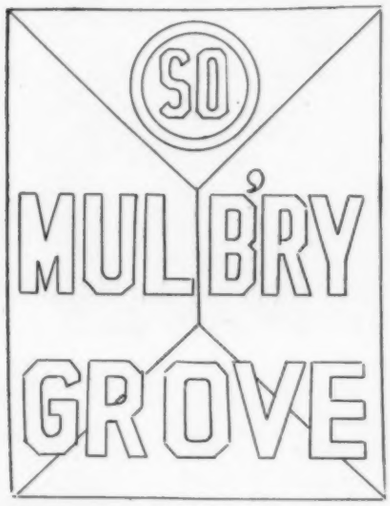
Marking the Airways

Standard Oil Co. of Indiana Progresses with Plan to Mark Airways.

By ALAN JACKSON
Vice-Pres. Standard Oil Co. of Indiana

THAT THE activities of our great commercial organizations are sometimes animated by other than purely selfish motives is well exemplified by the comparatively recent action of the Standard Oil Company of Indiana in undertaking the marking of the numerous airways which criss-cross that part of the United States where the Company has distributing facilities.

The need of some standard system of airway marking has been known and expressed ever since men began to make cross-country flights. The solution most usually accepted by the flier is to follow the windings of a river or of some one or another of our trunk line railways. These guides enabled him to check his course when weather conditions are favorable, but, from the air, towns look very much alike, and it is not always easy to distinguish details of objects on the ground, particularly when the visibility is poor, the atmosphere slightly hazy, or when a thin veil of smoke obscures the landscape. Under such conditions the flier sometimes loses contact with his guide and, before he is aware of it, he is flying over strange territory.



An Example of the Method of Roof Marking

Recognizing these difficulties, Carl Wolfley, vice-president of the National Aeronautical Association and Harry Block, Gov. N.A.A. for State of Missouri, conceived the idea of marking the country with a series of large letter signs to be painted upon the roof of buildings in towns over which fliers were likely to go. These markers were to show the name of the town in letters large enough to be read from a height of 2500 ft. After working out the general plan, Mr. Wolfley and Mr. Block called upon and discussed the matter with Charles H. Wagner, manager of St. Joseph, Mo., for the Standard Oil Company of Indiana, who suggested that the roofs of the warehouses and bulk stations of his company would be ideal spots for these airway signs. The Standard Oil properties are easily identified by the large white tanks which always are present, even though the observer be several thousand feet in the air and several miles away.

After working out the details of the scheme, Mr. Wagner submitted it to the executives of his company in Chicago, who, after a careful study of the problem, accepted the responsibility for the markings and authorized the necessary expenditure to carry on the work. The sign showing the name of the town and an insignia consisting of a circle enclosing the letters "SO" was designed at that time and since has been made standard. These call for a letter not less than six, nor more than eight feet high, having stems one foot in width. These letters are painted clear white on a black ground. Following the International Convention, the top of the sign name always is toward the North and above the name is the symbol. Wherever there is a good landing field available in the vicinity of the station, a white arrow is painted in connection with the Standard Oil symbol, pointing directly toward this field.

Over 300 Stations Marked

Before giving a general order to paint signs on the roofs of its buildings, the Company had one station near St. Joseph, Mo., painted and planes sent out to observe the effect. It was found that the sign could easily be read from a height of more than 2500 ft., and demonstrated the practical usefulness of the idea. Before final action was taken by the executives of the Standard Oil Company of Indiana, the general plan in detail was submitted to General Patrick, Chief of Air Corps, for his criticism and approval.

While it is still too early to report the final results obtained, it is known that today the airways of the United States are well on the way to become adequately marked. In the Standard Oil Company of Indiana territory upwards of 300 stations carry the standard markers, while others are being painted as fast as possible.

It cannot be said that this tremendous job was undertaken by these great commercial organizations for purely selfish reasons. It was undertaken because the men charged with the management of the several companies are far-sighted humanitarians. They realize that the fliers must take great chances every time they descend to a level where they can identify a town while checking their position. They know that if the flier can maintain an altitude of from 2500 to 3000 ft. he is not likely to meet with a serious accident in case he is compelled to make an emergency landing, and they recognize the importance of minimizing this danger of flying in order that the establishment of commercial aviation may be encouraged.

A typical Standard Oil Co. warehouse marked.

AIRMEN PREFER AVIATION because it is their magazine

The Oldest American Aircraft Magazine

The Only American Aircraft Weekly

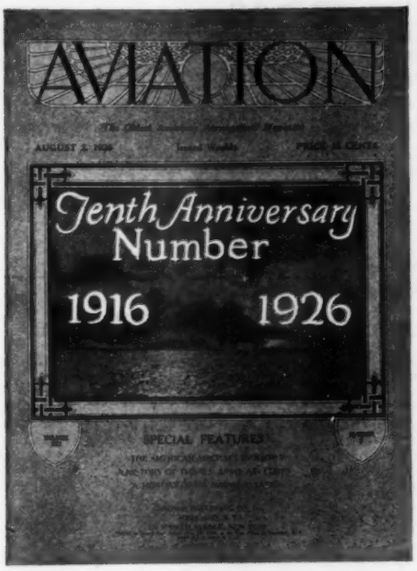
AVIATION represents their interests and point of view

Comes to them each week

Covers first the news in which they are interested

Prints more descriptions and photographs of planes, engines and accessories

Publishes practical articles by authorities on construction, operation, repair and maintenance, sales and utilization of aircraft



Gives more in both quality and quantity

Is dependable and accurate

Leads in vigorous and unbiased editorial expression

Backs up its readers and advertisers with a service based on ten years' continuous publication of America's leading aircraft publication

Presents in the advertising pages up-to-the-minute information for the buyer of planes, engines, accessories, equipment, supplies and materials.

Read AVIATION each week for real knowledge of aircraft, aerial service, air transportation and the men and organizations who are building up the new aeronautical industry.

Start your subscription with the four special September issues of AVIATION covering the National Air Races for the only closeup of the events and review of the outstanding construction and technical advances of the year.

BUT USE THE COUPON AND SEND IN YOUR SUBSCRIPTION NOW, AS WE HAVE NEVER BEEN ABLE TO SUPPLY THE DEMAND FOR THE ISSUES OF *AVIATION* COVERING THE NATIONAL AIR RACES OF OTHER YEARS.

Fifty-two Issues: In the United States, $4.00; *Canada,* $5.00; *other countries,* $6.00.

AVIATION

225 FOURTH AVENUE, NEW YORK CITY.

AVIATION, 225 Fourth Avenue, New York City

Check X

One Year	
Six Months	

For the enclosed $, enter my subscription to AVIATION as indicated by check mark (X) at left.

*NAME*_____

*ADDRESS*_____

A Cow Puncher Reports the Denver Meet

By Jack Flipper

Packing by spurs where they wouldn't bite me I shook the dust of Cheyenne Frontier Days out of my five gallon Stetson and rambled across the line into Denver for the National Mile High Air Meet, Aug. 1, 2 and 3.

Arriving at the Lowry Field corral, I hog tied the mare to a Ford axle and watched the stampede of long and short horned mavericks hop the gate of the corral. An Eaglerock with T. C. Alexander in the saddle came sky hootin' in from Los Angeles, roping first money in the On-To-Denver race. Another Eaglerock romped in from Colby, Kan. with Paul C. Vernier as rider. He got second prize, while third money went to T. J. McConaughey of Satanta, Kan.

I'll be a slab sided tenderfoot if the air from then on didn't seem full of snortin' cayuses and skyriding champeens, while I and the rest of the ground worms stood first on one high heel and then the other, getting a kink in our necks trying to watch the calves on the side lines as well as the antics of those winged fuzztails.

The Contestants

Sunday bloomed bright and fair with the sun eatin' holes in my yeller neckerchief and the dust from the herd of breezy critters multiplying the few dry spots in my throat, left over from "Cheyenne Days". Meandering over to the new club house, I picked up this list of the boys who were strutting their stuff. Flyers registered at Lowry aviation field for the National Mile High Air Meet included:

1st Lieut. Donald G. Duke, aid to Major General Patrick, Chief of the Army Air Corps, from Bolling Field, Washington, D. C., flying a Douglas; 1st Lieut. L. B. Beau, Army, Bolling Field, flying a Douglas; Tex La Grone, civilian, Kansas City, flying a Waco; Paul C. Vernier, civilian, Denver, flying an Eaglerock; Robert B. Rolando, civilian, Denver, flying an Eaglerock; Major R. E. Spake, Major H. H. Arnold, Capt. A. R. Schelleen, and Lieuts. I. C. Davis, Martin Stenseth, and H. F. Dyer all of Marshall Field, Fort Riley, Kan., and all flying Douglas 0-2 planes; Lieuts. D. D. Watson and W. E. Whitson, both of Brooks Field, Tex., and both flying DH-4's; Vance Breese, civilian, San Diego, flying a Ryan M-1 monoplane; Lieut. G. L. Davasher, Fort Sill, Okla., flying a DH-4; Major F. T. Evans, Capts. H. D. Campbell and F. P. Mulcahy and Lieut. J. N. Smith, all Marine Corps fliers from San Diego, and all flying DH-4's; Joe Shalz, civilian, Brewster, Kan. flying a Curtiss Standard; J. M. Conaughy, civilian, Wichita, Kan., flying a Travel Air; J. R. McInaney, civilian, Denver, flying an Eaglerock; Lieut. Claire Stroh, Heinsohn Field, Pueblo, flying a JNSE-4; Lieut. G. M. St. John, Kelly Field, Tex., flying a DH-4 and George Lyle, civilian, Santa Monica, flying a Travel Air OX-5.

Members of the 120th Observation Squadron, Lowry Field, who were taking part in the Meet, are not registered with the visitors. The foregoing list includes only pilots and does not include observers, mechanics or passengers.

Preliminaries

Getting back to the arena where sons of aviation were crying "contact", then ricocheting around the arena on the top side of seesawin', sunfishin', eat-hoppin', two wheeled turntables, I found that it wasn't the Crazy Man's Race but a warming up process for the big works. Finally the air got cleared again and Hell'n Maria Dawes our vice-president, and Colorado Governor, Clarence J. Morley were escorted to the grand stand, while Deloras Conrad as "Miss Denver 1926", contestant for the title of "Miss America", was crowned Queen of the Air. Some queen, boys, you can put that in your Bull Durham sack!

One after another, bronces were given the gun, while 100,000 flivvers dodged each other and my tail feathers, searching for vantage points. The air was soon thick again with giant Douglases, huge De Havilands, sturdy Jennys and a fair herd of young ponies called light commercial planes.

Following the grand march around the field, each returned to his stall, so I took off my earmuffs and started down the line to get some news to write back home. Right in front of me were a couple of hombres that seemed to know one end of the dinged things from the other so I reined close to their chatter. There were some machines that looked as big as the Bar O ranch house, that he called Army planes—then there were four just alike which he said were made within a few miles of where we were. I had them spotted already and knew he meant Eaglerocks. I noticed though that one was a bit different than the rest for for it had a motor he called a Supper Room stuck on its nose.

A little farther on, a puncher was monkeying with the engine on another plane. He looked as though he could ride herd with the best of our cow hands but learned he got that squint from flying for fourteen years. They said he was Tex La Grone from K. C., Missouri and the cayuse he was riding was a Waco. Next to the Waco was a long lean boy with a permanent grin. Caught his name as McConaughey and the healthy steed he was getting ready to mount was called a Travel Air. Swell name that and think will make a good handle for my next pony.

The gang of Waco, Travel Air and Eaglerock riders were kidding each other as to who had the best job and offering to bet part of their underwear on the first race. It looked like a bit of blood, so stuck around. And they did race. With the yell of "contact" they stirred up the grit and into the air, turning on wing end at the post and then around the course "hellbentferlection."

Some Winners

Well, I didn't hold my breath until it was all over but sure felt like it and found I had chewed a fair chunk out of my new Stetson. As those cayuses zoomed at the finish I checked off Eaglerock, first; Waco, second; Eaglerock, third; Travel Air, fourth; and another Eaglerock, fifth; so guess they must make the Eaglerock with a governor so that it can sandwich in anywhere.

After those boys had thrown their reins over the props, gibes, consolations and underwear were exchanged with a smile which was as it should be for they sure got all there was in their nags behind them for the ten turns around the track.

All at once, a little filly with only one wing started across the field right like he was going somewhere. I thought he was looking for the other wing along the ground but he pulled in on his lines and roared up into the blue, tieing the trail behind him into half turns and hitches. Well, the other riders stood watching his crazy antics with sheepish expressions and I heard one say "That's the Ryan money plane. It's a peach, but its got 200 hp. against our 90." So, says I to myself, "Think of having 200 horses to pull that peanut stand—why we only have two mules to pull our chuck wagon over the hills and it does all those upside down stunts, too."

Then they had a climbing race for the ponies under 100 hp. They sent one of the big Army mules up to stay at 2500 ft. Then the first one that got up to it was to win but the jigger they have, to tell how high you are, went bad and the rider kept climbing. They said it was a DH and when I asked what that meant I got the answer that it was "Dam high."

So that race was called off and they were going to run it over again but one of the contestants had pulled out for the Ford Tour and that was that.

The rest of the races were run without me as I got a wire from the old man down in the San Luis Valley to spank our tails back to the ranch so me and Hortense headed South, figuring on striking Pueblo in time to be in on the finish of the Denver, Colorado Springs, Pueblo Reliability Tour, which we did.

Arriving at Pueblo, Tuesday morning, we nosed our way out to the field and killed time reading telegrams and reports of the races, I had missed. In the speed race for over 100 hp.

Vance Breese in a Ryan M-1 with a Wright Whirlwind engine took first place; C. D. Clark of Wichita, Kan., second, in a Hisso Travel Air; P. C. Vernier, third in a 120 hp. air-cooled Eaglerock; and J. H. Cordner, flying a Woodson Express with Samson engine, was fourth.

Altitude Tests

In the altitude test for planes over 100 hp., which was something I could shoot the old man for making me miss, Ryan M-1 (200 hp. was first; P. C. Vernier in the 120 hp. Super Rhone Eaglerock, second; C. D. Clark of Wichita in a 180 hp. Travel Air, third; and J. H. Cordner in the Woodson Express, 260 hp. was fourth.

About the time I was finishing my notes on the telegrams speeks began to appear in the sky and before I could get the slivvers of pencil end from between my teeth and my spurs untangled from the chair rungs, the ponies began to roar in. Woodson Express lead the pack and touched the field first while the next three fillies, all with OX-5 engines came piling in on each others' tails. Travel Air got her hind legs on the ground for second place while the Eaglerock, ridden by a wild Irishman named J. A. McInaney, who thought a contest rule was a stick of inches, went shooting down the field without touching his wheels until he wised up to the fact that he was off the trail and circled back for a landing. It cost him third place as Waco beat him to the ground by three seconds and the Travel Air by four minutes.

P. S. Well Buddy, here I am back in Denver. I've wired the old man to put my job where the crows won't get it, sold my leather and drove Hortense out to the soap works. McInaney of the Alexander outfit right in this town, says he'll make a pilot out of me before I can get rid of the horsey smell or bust a prop. The moral is don't get too dam enthusiastic.

Yours to the ears in gas and oil,—Jack.

MacCracken Orders Lights for Airways

The purchase of ninety 24 in. revolving lights at $467.00 each to facilitate night flying on seven established airways, has been authorized by the Hon. William P. MacCracken, Jr., newly appointed Assistant Secretary of the Commerce for Aviation. The low bidder, The Sperry Gyroscope Co., has received the entire order.

The lights, with a normal visibility of 50 miles during favorable weather, will be placed 10 miles apart. Under ordinary conditions oncoming pilots will be able to see three or four of the lights while in flight.

Present plans provide for the complete lighting of the New York to Boston route. Dark ends will also be lighted at the earliest opportunity on the St. Louis to Chicago route; the Dallas to Chicago route; the Salt Lake City to Los Angeles route; the Pasco to Elko route; the Chicago to Minneapolis route; and the Cheyenne to Pueblo route.

The lighting work under Mr. MacCracken's supervision, will commence with the preliminary work of erecting towers for the lights and providing for other necessary equipment at once. Wherever power is locally available, that will be used. In other cases it will be necessary to provide gasoline generators which will be looked after by caretakers, probably on a part-time basis.

Steps are being taken to provide for the lighting of the boundaries of emergency landing fields, usually about 40 acres in extent, to be laid out at approximately 30 miles apart along established airways. It is planned to have lights completely circle the emergency fields at intervals of about 300 ft.

The Department expects that the large revolving lights, which will operate all night wherever there is sufficient air traffic to warrant such use, will be delivered in from 60 to 90 days. If the preliminary installation work can be completed by that time, they will be installed and ready for operation shortly after delivery.

The air routes which are to be equipped by the Department of Commerce are to employ Sperry Beacons. These lights are of the incandescent twenty-four inch type, and are made of cast corrosion-resisting aluminum alloy, thus combining strength with extreme lightness. They are provided with a lamp changer which automatically swings a new lamp into focus in case the one in use burns out. This is considered an extremely important feature in assuring continuous and reliable operation of these beacons. A finely ground glass parabolic mirror insures the maximum efficiency of the light. By means of a motor built into the base, the light is rotated at the rate of six times per minute, thus making the powerful beam visible to the airmen at a distance of twenty-five to fifty miles from all points of the compass.

Sky Printing

The Sky Printers, of Liverpool, England, whose process is protected by patents in Great Britain, France, Canada, and the principal countries of the world, recently made application in the United States for a patent to cover their invention. They claim that their particular style of sky advertising requires no skill on behalf of the pilot and no special plane.

From a plane flying one to two miles high, groups of fireworks are fired, spelling the words necessary to picture the advertisement. The apparatus consists of a series of small firing machines, each comprising a number of interconnected Verey's pistol barrels, pointing in different directions, in accordance with the letter required. Verey's smoke puff generating cartridges are placed in these pistol barrels and upon the pilot pulling a lever, each machine automatically fires its group of fireworks into the air, where they burst simultaneously forming letter after letter, each about 80 yards square. An average advertisement is completed in ten seconds.

A Study in Oddities—The Auto Giro (top) and the Pterodactyl, the tailless airplane, performing at the R.A.F. Display in England recently

Travel Air

IN ALL modesty, Travel Air humbly acknowledges the many kind tributes from friends who have come to know Travel Air excellence of design and Travel Air performance.

That many pilots write us, unsolicited, telling of performance beyond our promise is not surprising to us. We build our planes well and rate them conservatively, and this shall continue to be our policy.

Light commercial craft—heavier, more spacious planes—special models for special purposes—all these may be had with the Travel Air built-in dependability and sterling behavior.

Interested persons are requested to see or write the general office or any Travel Air distributor named below.

TRAVEL AIR MANUFACTURING

Factory and General Offices, Wichita, Kansas

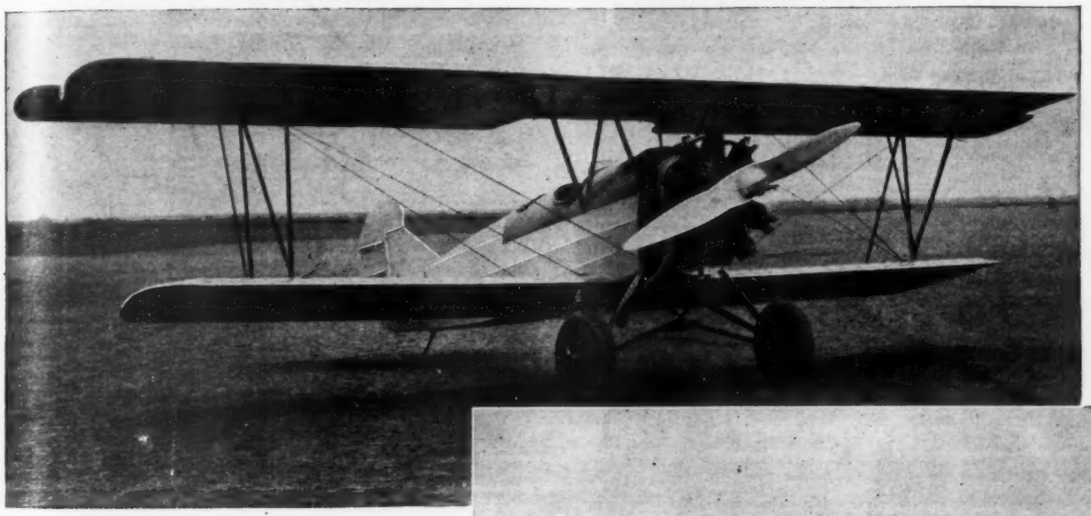
Boston Airport Corporation
Box 126, East Boston, Mass.

George Wies
250 Jackson, Mineola, N. Y.

Chesapeake Aircraft Co.
Headquarters Armory
Howard and Biddle Sts., Baltimore, Md.

J. Carroll Cone and
W. F. Moody
Little Rock, Ark.

As time goes on the name takes on added lustre



ABOVE—Travel Air with Wright Whirlwind engine. This type, equipped with Pioneer Navigating Instruments, won the Ford Reliability Tour and will fly at the National Air Races.

AT RIGHT—Regular commercial type Travel Air, with OX-5 engine. This model is winning enthusiastic endorsement throughout the country, both in competition and in regular service.

NACTURING CO., INC.

l Ge e, Wichita, Kansas

. Noyes
llas, Texas

Bob Shank
Huntington, W. Va.

Lyle-Hoyt Aircraft Co.,
Box 121, Santa Monica, Cal.

Burns Fliers
2800 W. Grand Blvd.
Detroit, Mich.

Compania Mexicana De Aviacion, S.A.
Edificio Novedades, Apartado 1032
Tampico, Mexico

The Bird Two-Seater Touring Plane

An OX-5 Engined Covered-Cockpit Type Two-Seater.

A VERY interesting Curtiss OX-5 engine commercial airplane which has been produced during the past six or eight months is the Bird plane manufactured by the Bird Aircraft Company of San Diego, Cal. The plane has a very good performance and is the result of careful design carried out by Lieut. N. A. Goddard, U.S.N.R.

However, most noticeable in the design of the machine is the fuselage which is of the cabin type with long windows on each side. Accommodation is provided for two persons and there is ample room for baggage in the cabin.

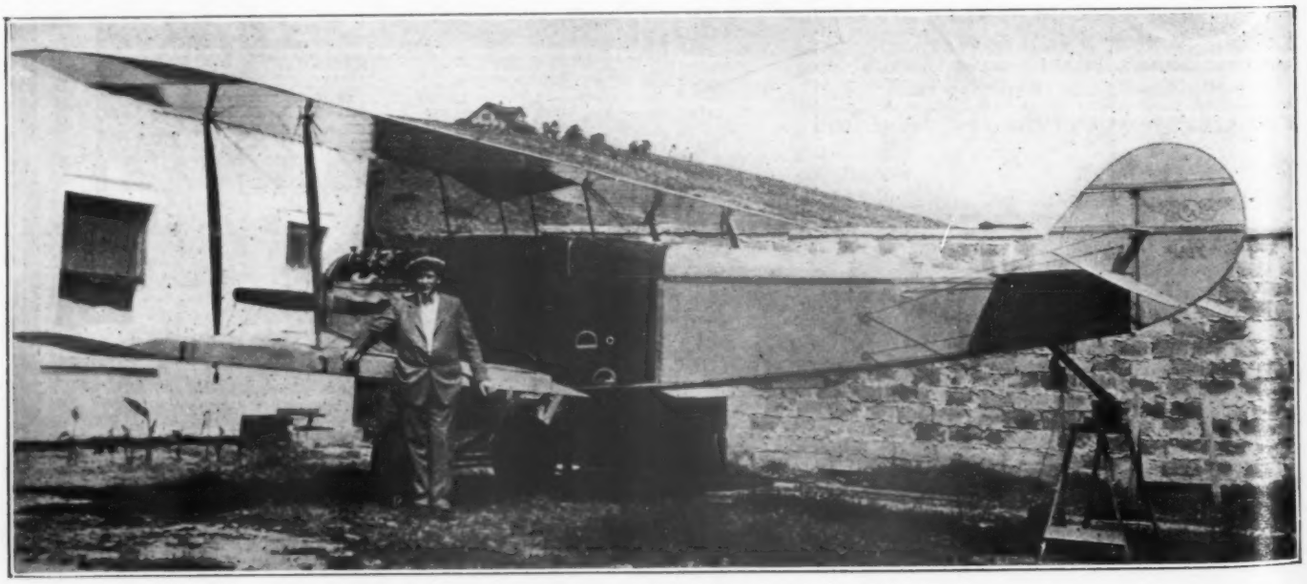
The wings are of wood construction and of Clark Y section, incorporating box type spars. On the other hand, the fuselage is of welded steel tube, wire braced where necessary.

The Bird two-seater touring plane (Curtiss OX-5, 90 hp.)

As will be seen in the photographs, the Bird plane is of more or less conventional aspect, being a biplane with a single interplane bay on each side of the fuselage and a normal through-axle type undercarriage and the engine housed under a simple cowling giving easy access to the cylinder heads. The radiator is of the well-known and, in the past, much used, nose type.

A few details of the Bird airplane together with the manufacturer's figures of performance are:

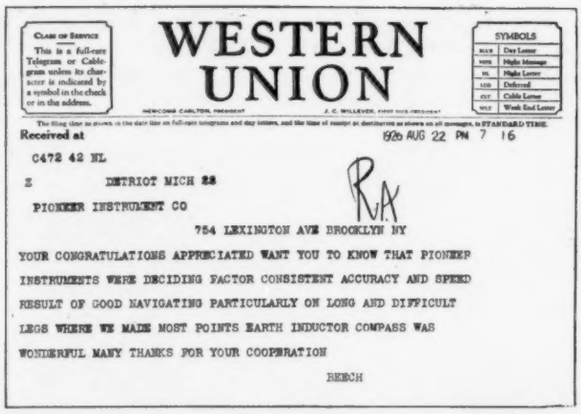
Weight	1,000 lb.
Speed, wide open	110 m.p.h.
Speed, cruising	95 m.p.h.
Cruising range	5 hr.



Another view of the Bird two-seater touring plane (Curtiss OX-5, 90 hp.)

The Winning Combination

Walter Beech, Vice President, Travel Air Mfg. Co., pilot, and Brice H. Goldsborough, Treasurer, Pioneer Instrument Company, navigator.



WESTERN UNION

Received at 1926 AUG 22 PM 7 16

C472 42 NL

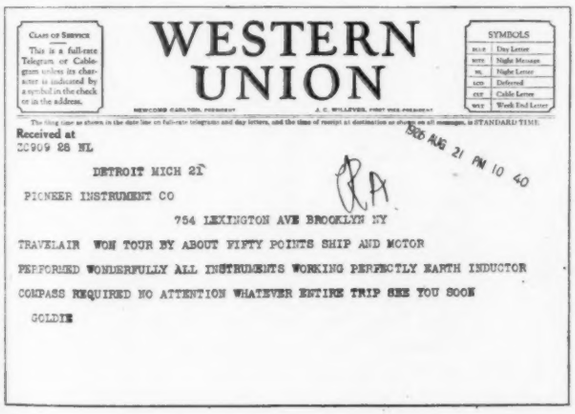
Z DETRIOT MICH 28

PIONEER INSTRUMENT CO

754 LEXINGTON AVE BROOKLYN NY

YOUR CONGRATULATIONS APPRECIATED WANT YOU TO KNOW THAT PIONEER INSTRUMENTS WERE DECIDING FACTOR CONSISTENT ACCURACY AND SPEED RESULT OF GOOD NAVIGATING PARTICULARLY ON LONG AND DIFFICULT LEGS WHERE WE MADE MOST POINTS EARTH INDUCTOR COMPASS WAS WONDERFUL MANY THANKS FOR YOUR COOPERATION

BEECH



WESTERN UNION

Received at 1926 AUG 21 PM 10 40

CC909 28 NL

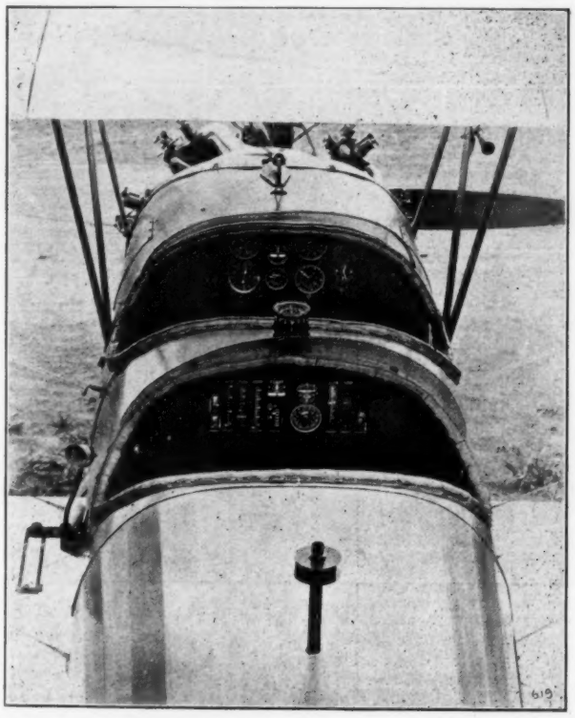
DETROIT MICH 21

PIONEER INSTRUMENT CO

754 LEXINGTON AVE BROOKLYN NY

TRAVELAIR WON TOUR BY ABOUT FIFTY POINTS SHIP AND MOTOR PERFORMED WONDERFULLY ALL INSTRUMENTS WORKING PERFECTLY EARTH INDUCTOR COMPASS REQUIRED NO ATTENTION WHATEVER ENTIRE TRIP SEE YOU SOON

GOLDIE



Whirlwind Travel Air, Pioneer Instrument Company's "Flying Showcase", with two complete instrument boards. Compass Generator rear of cockpit.

Goldsborough says "Ship and motor performed wonderfully". Beech says "Pioneer Instruments were deciding factor".

The Ford Tour has demonstrated that a well equipped airplane, properly piloted and navigated, can fly accurately and safely regardless of weather.

All flying is racing—racing against time and other modes of travel. Time lost following rivers and railroads can never be regained.

Commercial aviation demands speed and straight flying—not just for two weeks, but every week in the year. Pioneer instruments, properly used, cut down elapsed time, increase operating efficiency, and reduce costs by saving wear and tear on engine and airplane.

See the "Flying Showcase" at the Races.

PIONEER INSTRUMENT COMPANY

MAIN OFFICE AND FACTORY BROOKLYN NEW YORK USA

New N.A.T. Schedule

A fifteen minute later departure of northbound N.A.T. air mail planes from Dallas and Fort Worth, Tex. to Chicago, will considerably benefit Southern Texas points in their use of the air mail service, and according to the N.A.T. schedule has been altered to effect this advantage.

Port Arthur, Beaumont, and Galveston, are the principal cities benefited, but Houston and San Antonio also will be able to make use of later trains in air mail dispatch as a result of the new arrangement. Under the present schedule,

N.A.T. executives. Left to right, E. P. Lott, manager of operations; Paul Henderson, general manager; and C. T. Ludington, chairman of the technical committee, N.A.T.

connections are not always made at Dallas and Fort Worth with the mail planes by early morning trains from the South. The new schedule is designed to improve the situation. It moves back the departing time at all cities on the route and brings the mail into Chicago at 7.35 p. m., fifteen minutes later than formerly but still in time to catch the overnight Goverment line for New York, which leaves at 8 p. m.

A United States-Europe Air Route Again

A trip of investigation to Reykjavik, Iceland, for the purpose of studying weather conditions and the possibilities of a future airplane route between Europe and the United States has recently been made by Dr. Danmeyer and Dr. Georgi, university professors at Hamburg, Germany.

The proposed air route would start at Hamburg and pass via Scapa Flow the Farce Islands, Reykjavik and Cape Farewell, Greenland, and would have New York as its ultimate destination. It is planned to send a large scientific expedition to Iceland next year for the purpose of investigating in detail all conditions which would be likely to affect the operation of airplanes over the contemplated route.

Side Slips

By Robert R. Osborn

Sometimes we absolutely despair of ever being successful in our self-appointed task of showing the manufacturers engaged in "this airplane business" how to advertise properly. After all of our talk about it in this column for the last few months, a prominent designer disregarded our advice altogether, and had the trial flights of his Trans-Atlantic plane in the same old way. There were no pretty girls to be photographed turning over the propellers, no famous actresses at the controls for the first flight, and no lightly-clad nymphs symbolizing "The Spirit of the Trans-Atlantic Flight" to christen the plane when it came out of the hanger. We hate to have to use the old "told you so", but we must point out to this designer that most of the crowd, that might have witnessed his first flight, was over at a neighboring field watching motion pictures being taken of pretty girls climbing around an old Curtiss Oriole.

• • • •

We must admit, though, that even if our oft-repeated advice did go unheeded, the new plane certainly did not suffer from a lack of newspaper publicity. Most of the newspaper articles were very enthusiastic about the new machine, as everyone who has seen it perform seems to be, but some of the reports of the tests were surely bordering on the melodramatic and remindful of "Tom Swift and His Monoplane" days. Here are a couple of the prize quotations, taken at random from the New York newspapers: "Less than 200 yards from the start, her wheels seemed to tire of the substantial sod and decide to roll along on the air, much as a man sometimes feels himself walking on nothingness in a dream. The S-35 was off. 'Thirteen seconds', said somebody with a watch in his hand,'—, what a ship'.", "With the three 425 hp. Jupiter engines snarling angrily, the giant ship had roared into action." "The big plane responded to the controls as easily as a sensitive horse does to the least touch of the rein."

• • • •

The State Department at Washington, according to the news, has requested permission from a number of South American countries, for five Army planes to make a 16,000 mile tour of the continent. Of course, we cannot claim to be an expert in international affairs, but if we may express an opinion, this request for permission to fly over these countries is much too premature. The flight apparently is not to take place until December and possibly none of the governments, now granting this permission, will be in power when the flight is actually started.

• • • •

A recent advertisement for an automobile using an air-cooled engine contains the statement that "nearly every new design in commercial planes has chosen the air-cooled engine, according to one of the country's leading aircraft engine experts." Puzzle Contest: Who is the leading aircraft engine expert referred to? Answers to this puzzle are limited to one per person and must be mailed within four years. The basis for awarding the prizes will be that anyone unable to answer correctly will not be allowed to renew his subscription to AVIATION without the payment of the usual four dollar fee.

• • • •

When we saw The Intrepid Aviator last, he was on his way over to offer Mr. Sikorsky a bit of advice. He thinks that, with the New York-to-Paris plane heavily loaded for that trip and its consequent low ceiling above sea level, it might be a good idea to take off at high tide, thereby gaining an extra four or five feet.

AIRPORTS AND AIRWAYS

Altoona-Tyrone Aero Club

By Walter A. Hite

The Altoona Aero Club was organized in January 1926 with a membership of ten. The original membership was increased to twenty-five and then a suitable field was sought out. A field was located nine miles East of the city. It lies between the tracks of the main line of the Pennsylvania Railroad and the Original William Penn Highway. It is 1500 yd. East of the Famous Altoona Speedway which serves as an excellent marker. The field is marked by a large white circle which can be seen from a distance. The field contains thirty acres and plans are under way to add to this adjoining land which will increase it to approximately fifty acres. There are no hangars on the field at the present time, planes being left in the open. However, we hope to have suitable buildings erected before cold weather comes.

All fliers are invited to use this field at all times, especially those who are attending the National Air Races at Philadelphia. Gasoline, oil, water, etc., can be secured here and all assistance possible will be given.

Some time ago the town of Tyrone, which is five miles East of the field asked to be recognized in connection with this project. A vote was taken and it was decided that in the future the club was to be known as The Altoona-Tyrone Aero Club and the field as the Altoona-Tyrone Airport. The people of Tyrone are behind the movement and with combined efforts of the two cities the field should be developed into a very modern one in every respect.

From the original ten members the Club has grown until the present membership is seventy-five.

Local fliers have been using the field extensively during the Summer. Ralph Haynes has been doing a lot of commercial work, carrying passengers and giving instruction. Ralph Dodson, a newcomer from Uniontown, has his Standard at the

Altoona-Tyrone Airport. The square shaped piece of land at the top center of the picture is the field

field and Sunday afternoon finds Ralph busy taking passengers up. Earl Fasick has his Jenny going and it has been flown by several of the fellows. Fasick is one of our best boosters. There have been several other planes at the field,

FOKKER

The American designed and American built **FOKKER** aircraft on the lines of Colonial Air Transport, Inc., and Philadelphia Rapid Transit Air Service are duplicating daily the dependable record of the past six years which **FOKKER** planes have established on European air lines.

AMERICAN BUILT FOR AMERICAN COMMERCIAL NEEDS.

There is a Fokker dealer in your territory.

DETAILED INFORMATION GLADLY FORWARDED UPON REQUEST.

FOKKER AIRCRAFT CORPORATION
110 E. 42nd Street
NEW YORK, N. Y.
Cable—Fokplanes, N. Y.

ATLANTIC AIRCRAFT CORPORATION
Factory and Flying Field
HASBROUCK HEIGHTS, N. J.
Cable—Atlair, Hackensack, N. J.

An airplane of the highest degree of dependability

all of them doing their share of flying. Henry Millon photographer has been doing a nice business, having obtained some remarkable pictures for various firms.

Gary Field, Indiana

By J. A. Yonge

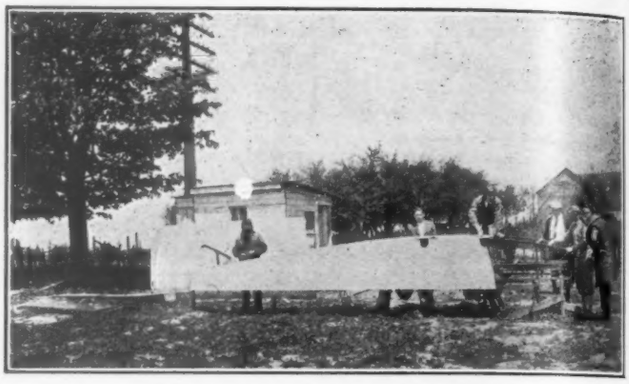
The Gary Flying School field is located between Gary and Crown Point, Indiana and is exactly five miles due North of Crown Point on the Southwest corner of the intersection of two concrete roads. Standard Oil Company aviation gasoline and oil are always kept on hand. Interurban car service takes passengers very conveniently from the entrance of the field to Gary or Crown Point. The field itself covers 115 acres and although it is slightly rolling and a little rough it is dry at all seasons of the year.

Due to the marshy ground and the thick smoke close to the city of Gary it is very difficult to locate a suitable air port right close into the city. The Gary Flying School field is on much higher land than the city of Gary and surrounding it are many fields very satisfactory for emergency landings.

Student business has been very good indeed this year. The following have made their solo flights within the last two weeks: Al Crouse of New Jersey; W. McMahon of Gary, Indiana; R. McClenaghan of Lakewood, Ohio; and Harry Atkinson of Windber, Pa. The last two have taken their F. A. I. certificates. Russell Hankfort of Chesterton, Indiana and George Austgen of Schereville, Indiana, who were trained at the Gary Flying School, are now flying their own planes and becoming expert pilots. A new student Raymond Bader of Galena, Illinois, has recently joined the school and is progressing very favorably in his air work. Elmer Martin of Stubenville, Ohio, has been taken on as assistant at the Gary Flying School. Bill McMahon made several cross country trips in an Eaglerock, preparatory to leaving for Denver to fly back his new Eaglerock which he has purchased through Capt. J. A. Yonge.

On Sunday morning Aug. 15, Captain Yonge took two students in the Eaglerock to the Air Mail field at Maywood, to inspect the planes in the Reliability Tour. He returned about midday and carried 45 passengers during the afternoon. Numerous photographs have been made for Mr. Clason of Kaufmann and Fabry, Chicago, Ill., the most important of which were those taken at Mundelein, Ill. at the time of the Eucharistic Congress.

Several demonstration flights have been made by prospective purchasers of Eaglerocks with excellent results.



Student work at the Gary Flying School

Madrid, Spain

In the future the offical director of Spanish Air Service will select those who he believes are qualified to attempt long distance flights. The government feels that such a step is necessary due to the wide interest caused by Franco's flights which has attracted so many to imitate him.

The government has issued a notice to all aviators wishing to make flights in Spain or to Spanish possessions, to make application, specifying kind of plane. Aug. 15 was the time limit on applications.

Learn to Fly

$100 — Including Solo

No bond required
No charge for breakage

76 Students Graduated in 1925

Eight years without an accident

Room and board near field at $10.00 per week.

We guarantee to solo our students regardless of the number of flying hours required. We also furnish planes at very reasonable rates for those who wish to qualify for the F.A.I. pilots certificate and we maintain an employment agency for our graduate pilots.

The flying school of the Robertson Aircraft Corporation is one of the oldest and best known in the United States. Our instructors are ex-army aviators and are mail pilots with wide experience and our training equipment is the best obtainable. In over eight years of operation our students have never damaged a ship in their solo flights.

The flying field is approximately six miles from St. Louis and is easily accessible by railroad, street car and hard surfaced roads. It is the largest and best privately owned field in the country and the International Races of 1923 were held there. Mail planes arrive and leave daily.

Our course requires about two weeks, depending on the individual, and after its completion the refinements of the art can be gained only from experience. Commercial aviation is a rapidly growing industry. Don't delay! Enroll now!

It is not necessary to purchase an airplane in order to take this course.

WRITE FOR BOOKLET

Guaranteed Condition Airplanes, Ready for Immediate Fly-Away Delivery, at Prices Ranging from $650.00 to $1,750.00

ROBERTSON AIRCRAFT CORPORATION

OPERATORS OF ST. LOUIS-CHICAGO UNITED STATES AIR MAIL

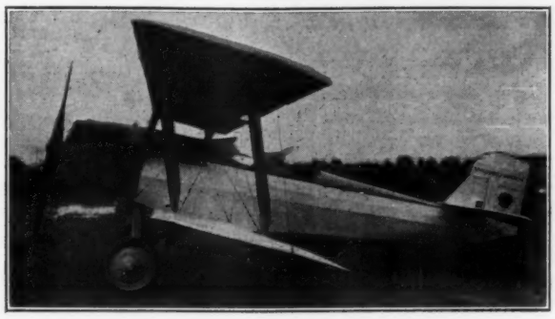
LAMBERT-ST. LOUIS FLYING FIELD, ANGLUM, MO.

=ANNOUNCING=

The New Woodson Mail and Sport Plane.

Divided axle with eight foot tread.

Adjustable stabilizer and vertical fin.



Steel tube fuselage and steel tail group.

Excellent visibility.

Woodson Sport fitted with Wright E-4.

Carries a pay load of 800 pounds and seats 5 people.

A change can be made to any of the following motors in 45 minutes: Salmson, Hisso, Wright J-4, Curtiss K or C-6, OX-5 or Liberty six. The power plant comes off as one unit, with radiator, oil tank, etc., attached to the mount.

Performance.

With Salmson,		With 180 Hisso,	
Maximum speed	135 M.P.H.	Maximum speed	125 M.P.H.
Minimum speed	45 M.P.H.	Minimum speed	40 M.P.H.
Pay load	800 lbs.	Pay load	700 lbs.
With Wright J-4,		With OX-5,	
Maximum speed	130 M.P.H.	Maximum speed	90 M.P.H.
Minimum speed	42 M.P.H.	Minimum speed	38 M.P.H.
Pay load	800 lbs.	Pay load	350 lbs.

WOODSON ENGINEERING COMPANY
BRYAN, OHIO

The Fairchild FC-1 Cabin Monoplane is the last word in an all-purpose ship. The utmost in vision and comfort. Folding wings, flaps for low speed landing; a ship perfect in control. Corrected tests by the Guggenheim School of Aeronautics give a speed range of from 38 to 97 m.p.h. on 90 h.p. with 330 lb. pay load, and a climb of 350 ft. per minute. Production models will give the same performance with 500 lb. pay load. Can be fitted with 200 h.p. Wright C-6, or 150 or 180 h.p. Hisso.

Let us send you our catalogue.

Manufactured by Fairchild Airplane Mfg. Corp.,
Farmingdale, L. I., New York
A Subsidiary of

Fairchild Aviation
CORPORATION

270 WEST 38 ST., NEW YORK

You Can't Lay It Down Till You Finish It!

Major H. H. Arnold

"A fascinating volume."
—Lieut. Commander Richard E. Byrd

Airmen and Aircraft

An Introduction to Aeronautics

By Henry H. Arnold, *Major, Air Corps, U. S. Army*

JUST published—the living, throbbing epic of man's conquest of the air to date, told by a pioneer air pilot. Scientifically accurate—in everyday language.

Types of aircraft and why they fly—their commercial and military future. How airmen are made—synopses of the complete courses of the Army and Navy flying schools.

The book you want in this age of air "flivvers," polar flights and ocean airways, to view the illimitable opportunities of the future. *$3.50*

A volume of the Ronald Aeronautic Library

The Ronald Press Company
Publishers: 15 E. 26th St., New York

Helena Airport News

Henry L. Lay

Bruce Black has disposed of his Hisso Standard to Mr. Brennan of Missoula who had a little tough luck with his faithful K-6 Standard sometime previous. Brennan is doing wonderful work spreading the "Aeronautical Doctrine" in and around the vicinity of Missoula.

Harold Lynch of Butte recently visited Helena in his Standard that he built up from the parts he recently obtained from Carl Tyler of Livingston. With him was his 11 year old daughter who certainly enjoys flying and got quite a "kick" out of the trip. The return flight was a little delayed because of rain that had been brewing since morning, and the weather remained dark and drizzly long after an expert take-off.

A false rumor that an expert elephant trainer was enroute from Kansas to Canada via Helena to recapture several escaped elephant from the Sells Floto Circus caused many of the aeronautical minded persons to keep their eyes peeled and their ears open without the just reward. We were expecting to see a new Travel Air or a Swallow, but got only sore necks from our vigilance.

The two light planes under construction by the Zenith Airplane Company are not advancing as rapidly as was expected because of a fact common to the majority of us. They will be out for test flights sometime this Winter along with a light two-place biplane. Mr. Black has temporarily dropped the idea of constructing a cabin Hisso engine job due to various reasons.

Ed Follensby is fixing his old Jenny up into wonderful shape. He has "souped" the engine up and has gone all over the fuselage until it is looking almost like a PW-8.

Jack Lay is giving us some hopeful chatter, and says to keep our eyes on the alert for a real three-place OX-5 plane that will be finished one of these days. Lack of sufficient funds has retarded the progress on the plane, but things are beginning to materialize. He and Harry Stone, who is at present spending a vacation in Laurel, have conceived a plan whereby they can take second hand machines in on a new one just as we now do with cars, without sustaining much of a loss. Good figuring:

Which brings up the question, "How could Pegasus fly with such little HORSE-Power?"

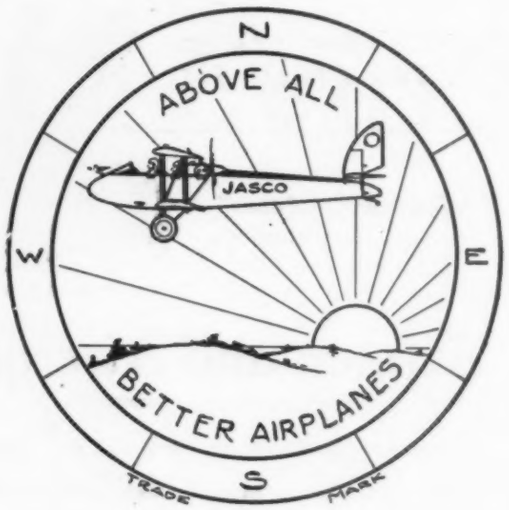
Memphis, Tenn.

The hope that business men and aviation enthusiasts have so long cherished for a public airport in Memphis has at last been realized with the selection of a field at Woodstock. Construction and the making of improvements are now under way, and the formal opening and dedication will take place in the near future. The first step in the plan that culminated in giving the city an adequate landing field was the formation of the Memphis Aero Club, Inc., last Armistice Day. The original membership of the club was composed chiefly of former service fliers, which was later extended to include business men interested in the development of aviation in Memphis.

President Bruce, of the Chamber of Commerce appointed a committee, of which Edwin Williams is chairman, to secure a landing field, the assignment being made without appropriation of funds. Vernon C. Omile, a local aviator, made surveys for available sites, which resulted in the selection of Woodstock, 11½ mi. from Memphis. The field is on the Millington Highway, extending 3,000 ft. to the Illinois Central right-of-way, with a cross runway north and south of the same length.

Grading, under the supervision of the Shelby County Commission was completed on the field, which is considered one of the most important parts of the undertaking.

The Memphis Aero Club, Inc., holds the lease and pays the owners $10. per acre per year. Leases cover a five-year period. During the period of the lease, definite plans for the purchase of the field will be formulated.



Send ten cents for illustrated catalog of material in stock.

Smooth Sailing

Without a worry, if you use new and inspected aircraft material as sold by Johnson Airplane and Supply Company.

An organization of experienced pilots, engineers, designers and skilled workmen.

A plant (40,000 feet floor space) with every facility to build airplanes in wood or metal.

Manufacturing new aeronautical equipment.

Distributing thousands of other items to the designer, builder and user.

In business since 1919.

Johnson Airplane & Supply Company

DAYTON OHIO

ALLIED: JOHNSON AIRCRAFT CORPORATION; JOHNSON FLYING SERVICE

DOPES

PIGMENTED DOPES
VARNISHES ENAMELS

TITANINE

MADE BY
TITANINE, Inc.
UNION, UNION COUNTY, N. J.
Contractors to U. S. Government

PLYWOOD

Water Resistant Panels
Made According to
Government Specifications
Any Size or Thickness

New Jersey Veneer Co.
Paterson, N. J., U.S.A.

RYAN M-1 $2890 to $8400

Superior Performance with
Super-Rhone, Curtiss OX5, Hispano-Suiza and Wright Whirlwind.

RYAN AIRLINES, INC. San Diego, Calif.
"The Plane That Pays A Profit"

$1000. LIBERTY MOTORS $1000.

SPEED AND POWER GUARANTEED—DYNAMOMETER TESTED IN YOUR PRESENCE

COMPLETE STOCK OF PARTS
UNSURPASSED FACILITIES FOR OVERHAULING AND TESTING ANY TYPE MOTOR

THE VIMALERT COMPANY, Ltd.

807 GARFIELD AVE. JERSEY CITY, N. J. TEL. DELAWARE 3150-51

TRAVEL AIR

AMERICA'S FOREMOST COMMERCIAL AIRPLANE

GEO. A. WIES, INC.

Hangar: Curtiss Field Office: 250 Jackson Ave., Mineola, N. Y.

Vernon C. Omlie who has been appointed manager, has contracted for hangars and expects to have them ready in a month. Filling stations have been installed and a club house and parking space will be the next provision made.

The field will be dedicated to the memory of Guion Armstrong, Memphis aviator, who lost his life over the lines during the World War.

The committee consists of Edwin Williams, Sol Seches and Louis Carruthers. Directors of the Memphis Aero Club are: Everett Cook, president, Louis Carruthers, vice president. Lacy Whitten, secretary, Robert Haverty, treasurer, Edwin Williams and W. Percy McDonald.

Detroit, Mich.

On July 28, Eddie Stinson flew the Detroiter cabin plane, equipped with the Wright Whirlwind, 200 hp., air-cooled engine, to Mackinac Island, in the Straits of Mackinac. He carried with him Mr. and Mr. Edward F. Schlee, of Detroit. Mr. Schlee is president of the Wayco Oil Corp., of Detroit. The trip from Detroit to Mackinac was made in 3 hr., 20 min., the distance being about 330 mi. The return trip was made in 2 hr., 20 min., with the help of a tail wind.

Mackinac is one of the country's most beautiful Summer resorts and the beauty of the island has been maintained by reason of the fact that an automobile has never been permitted there. When the Stinson-Detroiter landed on the golf course, in front of the Grand Hotel, it was the first gasoline engine, and, of course, the first plane, ever to do so.

It requires 24 hr. to reach Mackinac by boat. A number of persons spend their week-ends there, so this will indicate the part that the airplane can play in travel to this resort.

Havana, Cuba

Cuba inaugurated its first official international flight recently when Capt. E. Labodre and Lieut. G. Martull, Cuban Army aviators, started from Havana for Port-au-Prince Haiti, in two Army planes. The first stop was Oamaguey, Cuba.

Milwaukee, Wis.

The second annual Wisconsin Air Derby, which was witnessed by 250,000 spectators, demonstrated to the citizens the practicability of aviation. Before the start of the Court of Neptune Pageant, a score of planes, from the Reliability Tour, flew over the field, and landed at the Hamilton Airport, six miles from the pageant grounds. Numerous events were held, but the one which attracted chief interest was the race on a four mile course over Lake Michigan, which was one of the last. Frank Shoblaska and Dan Kiser finished together, at the end of sixty miles, and were crowned the Kings of Flight. The pilots were: Dan Kiser, Frank Shoblaska, S. J. Wittman, Fred Holterkoff, A. W. Schwarz, Giles Meisenheimer, Edwin Szubolski, J. P. Wood, Roy O. Larson.

Wiseman, Alaska

On Aug. 14, in a plane piloted by A. A. Bennett, of Fairbanks, former Governor William Sulzer, of New York, visited districts Northwest of Fairbanks, which had never before been reached by airplanes. A flight of 500 miles into the interior was made and landings were effected in fields and on river bars.

Alaskan Survey Praises Inverted Liberty

The Alaskan Survey Expedition has just reported to the Aeronautics Bureau of the Navy Department that the inverted Liberty engines used in the airplanes on the survey have put in more than 100 hours of flying time and still are functioning perfectly. The engines were overhauled at San Diego, Calif., Naval Air Station previous to the flight, the Bureau states.

Only one forced landing is reported to have occurred in Alaska, this due to a split nut on the tower shaft, which went through the gears. The motor was repaired on the spot, the report states; and since then has operated as well as ever.

Department of Commerce
Selects
SPERRY BEACONS

—orders 90 of the 24" size for use on the Country's principal airways.

The Sperry Gyroscope Company is recognized as a leader in light projection and is a pioneer in airway beacon and landing field lights. When planning your field take advantage of this knowledge and experience. Ask Sperry Engineers to assist in the layout of the lighting equipment—it incurs no obligation.

Our Booklet 20-1622 sent upon Request

Sperry 24" Beacon

THE SPERRY GYROSCOPE COMPANY
MANHATTAN BRIDGE PLAZA, BROOKLYN, NEW YORK
Contractors to U. S. Army, Navy, Air Mail and Dept. of Commerce.

B. B. T.

LIGHTING EQUIPMENT

USED AT THE NIGHT AIR CIRCUS OF THE

CATALOG OF FLOODLIGHTS AND BEACONS WILL BE GLADLY FORWARDED

B.B.T. CORPORATION OF AMERICA

ATLANTIC BUILDING PHILADELPHIA PENNA.

THE EMBRY-RIDDLE COMPANY, INC.
Distributors of WACO AIRPLANES
for Ohio and Kentucky

LUNKEN AIRPORT, CINCINNATI, OHIO
Announce WACO DEALERS for
Ohio and Kentucky

Johnson Airplane & Supply Co.
Dayton, Ohio.

George Wedekind, The Embry-Riddle Co.,
Middletown, Ohio.

Columbus Flying Service
Norton Field Columbus, Ohio.

Sanborn Aviation Co.
Willoughby, Ohio.

Edward H. Gast
1706 Windsor Pl. Louisville, Ky.

Complete Flying Service **Fastest Transportation to All Points**

To insure early delivery place your order immediately with our dealer or directly with the distributor

Flying School Complete Courses Pay as You Learn

HASKELITE WINS!!

HASKELITE has won the favor of aircraft designers, builders and operators wherever tried. It is winning new friends every day. Over 90% of the plywood used in aircraft construction is HASKELITE.

Designers find HASKELITE combines maximum strength with minimum weight.

Builders appreciate the uniform superiority of this product, the ease with which it can be worked and its unfailing dependability.

Operators know from experience that HASKELITE in a plane stands up under all weather and service conditions.

If you are not already familiar with HASKELITE from personal experience drop into Booth 44 at the Sesqui-Centennial Exhibition, Philadelphia, or let us send you full information.

HASKELITE MANUFACTURING CORPORATION
133 West Washington Street, Chicago, Illinois

United States Air Forces

Air Corps Long Range Photography

By M. B. Scales

Lens, filter and film to be used in attempts at long-range photography to be made by the engineering division of the Army Air Corps from McCook Field at Dayton, O., in September, have been completed and given thorough tests at Rochester by Army photographers and experts of the Eastman Kodak Company.

Lieut. George W. Goddard, of the Air Corps, flew to Rochester from McCook Field during the week of Aug. 9-15 with the idea of trying out the equipment. In landing at Britton Field, however, the tail skid of his wartime DH plane was broken and the pictures were taken from the top of the sixteen story Kodak tower.

The photographs to be taken in September will be made over a 200 mile range by a specially-built plane flying 35,000 ft. above McCook Field. A special lens, 9 in. in diameter and the largest ever built for aerial photography will be used. The picture, in size 9 in. by 9 in., will be taken on a film manufactured in the Kodak laboratories and capable of recording topography even through the ground haze. In combination with the lens, and film a new type of filter will be used, this also aiding in penetrating the haze.

Army Air Corps Photo

A night photo of McCook Field taken with the aid of flashpowder charges at 10:30 p. m. by Lieut. G. Goddard from an altitude of 1000 ft.

The camera built for the tests weighs 150 lb. weight being kept at the minimum. The finder will be attached to the pilot's seat, in order that Lieutenant Goddard may operate both plane and camera himself. The camera box is a development of Air Corps experts, and has a focal plane shutter new in type and governor-controlled to permit even speed full across the film. While the film itself is capable of recording photographs 9 in. by 25 in., it has been found that better results are obtained with the 9 in. by 9 in. picture, the larger size being lacking in sharp detail near the ends.

The camera will be dual-heated, two systems being used. One is electric, and the other is provided by the engine exhaust. Heating of the equipment is necessary because of the extreme sub-zero temperatures at the height of nearly five miles above the earth from which the photograph will be taken.

It is believed the photograph will show Detroit, some 218 miles away, with sufficient detail to enable Army engineers to ascertain the topography of city and vicinity. Detroit was selected for the test particularly on account of its white buildings. Detail generally will be lacking, experts say, al-

SPECIAL PRICES

FOR THE MONTH OF SEPTEMBER ONLY

OX5 Berling magnetos, complete, over-hauled in perfect condition, complete with points	$12.00
Best grade, new production, clear nitrate dope, barrel lots, per gallon	1.23
New L8 Simms Hisso magnetos, each	20.00
Five place, Hisso Standards, perfect condition	1000.00
Brand new OX5 motor, in the original crate, latest serial Nos. and last motors built for the government, Hammondsport and Willis-Marrow	250.00 to 400.00
	Depending on quantity
2¼" scalloped tape, new production, per yd.	.04
2¼" plain tape, new production, per yd.	.03
JohnsManville tachometer heads, Type A, brand new production	12.00
Standard J-1 lower wings from	20.00 to 60.00
Hispano-Suiza engines, all models from	350.00 to 675.00
Jenny nose plates	2.50
Hisso Model A, Inner connection rods, with bearings, each used	4.00
New 0 to 10 pound air gauges	.50
New Fahrenheit gauge assemblies	6.50
Two-to-one reduction Johns-Manville tachometer adapters, new, each	6.00
Grade A cotton, 35-in. wide, per yd.	.35
Grade A cotton, 39-in. wide, per yd.	.45
Large stock, assorted helmets	1.00 to 6.00
All makes of goggles	1.50 to 7.50
½" Shock absorber cord, per ft. (French Brown)	.08
Bethlehem spark plugs	.20

HISPANO-SUIZA MOTOR PARTS

American-hammered piston rings	.30
New piston pins, each	.75
Cam shafts, each	10.00
Cam shafts, covers, each	3.00
Cylinder banks, in perfect condition, each	50.00
Army reconditioned, heavy stemmed valves, each	.75

BRAND NEW OX5 PARTS

Crank shaft, each	7.50
Gear crank shaft, each	1.50
Valve springs, each	.05
Cylinder flange gaskets, each	.05
Cam follower guide assemblies, each	2.00
Cam follower guide only, each	.75
Follower intake cam, each	.75
Exhaust cams, each	.50
Connecting rods and caps, each	1.00
Connecting rods assemblies, each	2.00
Connecting rods bolts, each	.05
Connecting rods nuts, each	.05
Piston pins, each	.35
Piston rings, each	.12
Lower crank cases, each	12.00
Water pump assemblies, each	6.00
Oil pump assemblies, each	4.00
Berling magneto points, per pr.	4.50
Propeller hub puller	1.50
Socket wrench, crank shaft nut, each	.30
Socket wrench, propeller hub nut, each	.30
Water pump pack nut, wrench, each	.30
Thrust bearing lock nut wrench, each	.30
Intake pipe assembly, right or left half, each	1.25
Intake Y pipe Asy each	3.00
Intake Y pipe, each	2.25
Brace carburetor, (long cross), each	.30
Propeller hub body with flange, each	2.50
Exhaust manifolds, each	3.50
Flexible hot air tube, each	.75
Standard S.A.E. tachometer drive assembly, each	4.00
Complete set OX5 gaskets, consisting of eighty gaskets, per set	3.00
Complete set hose connections, consisting of twenty hose connections, per set	1.25

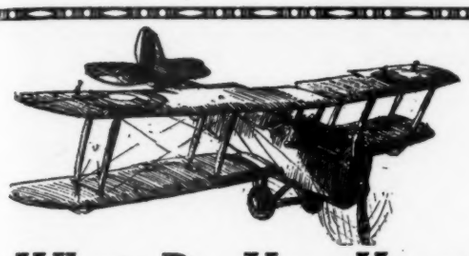
BRAND NEW OXX6 MOTOR PARTS

Oil sight gauge assemblies, each	2.00
Piston pins, each	.75
Pistons, each	3.00
Cylinder flange gaskets, each	.05
Piston rings, each	.20
Piston rings, over-size, each	.20
Cable tube assemblies, each side	4.00
OXX6 Simms magnetos, new, each	25.00

JN4D PARTS

Landing gear struts, each	2.00
Center section struts, each	2.00
Wing struts, each	2.00
Ailerons, each	5.00
Elevators, and rudders, each	3.00
Stabilizers, each	5.00
Vertical fins, each	1.50
New, nose type radiators, each	25.00
Turtle deck, each	10.00
Center sections, each	5.00

NICHOLAS-BEAZLEY AIRPLANE CO.
Marshall, Missouri



What Do You Know About Airplanes?

A FEW years ago men had to learn about aircraft from personal, costly experience. They had no one to guide them—no one to point out mistakes when they were made—and therefore years were spent learning what takes months now.

THOROUGH — PRACTICAL TRAINING

Today the American School of Aviation offers you these long years of experience and knowledge, which cost millions to acquire, in their new and fascinating Home Study Course in Practical Aeronautics which has been highly endorsed by prominent aviation authorities.

WRITE TODAY

No matter whether you have worked with airplanes all your life or are just beginning in the industry you owe it to yourself to send for a complete and detailed outline of this training and our new and interesting free book, "Opportunities in the Airplane Industry."

American School of Aviation

Dept. 8276

3601 Michigan Ave., CHICAGO, ILL.

At Your Service

Aero Supply Mfg. Co., Inc.

Manufacturers and Distributors of

Airplane Accessories and Supplies

Call on us for anything. We will help you.

College Point, Long Island, New York.

though it is believed it will be possible to distinguish streets, possibly buildings and certainly the general plan of the land.

It is planned to make the test probably about the last week in September. Lieutenant Goddard expects to be on leave of absence early in the month and to complete final arrangements for the flight upon his return. He has been in training for high-altitude work, and said during his visit to Rochester that when he made the attempt he planned to have everything, including himself, in perfect working condition and capable of obtaining desired results.

Lieutenant Goddard has made several flights to Rochester for the purpose of testing such of the equipment as was being made at the Eastman Kodak plant. On former occasions he made flights over the city, taking photographs during the trip.

In his recent flight to Rochester, with one passenger, Lieutenant Goddard made the 400 mile trip from Dayton, O., in slightly more than four hours.

Sowing Tree Seeds by Airplane in Hawaii

The Army Air Corps in Hawaii in cooperation with the Hawaiian Territorial Board of Agriculture and Forestry recently performed an interesting experiment in sowing tree seeds on forest reserve lands which had been devastated by fire. Several months ago a forest fire in the Panaewa forest reserve area near Hilo, Hawaii, laid waste to an area of about four square miles. Due to the rough character of the terrain, seeding by hand was found to be impracticable. A flight of two planes, consisting of Lieut. R. S. Worthington, Flight Commander, and Staff Sgt. Otto Ambruster, mechanic, in the Luke Field Loening Amphibian, and Lieut. J. D. Givens, pilot, and Staff Sgt. J. R. Monroe, radio operator, in the Wheeler Field Loening Amphibian, left Luke Field at 10.40 a. m. July 2 and arrived at Hilo at 1.20 p. m.

Lieutenant Worthington in the Luke Field plane made three trips over the burned area, a total of 24 bags of seeds being carried. The seeds were very light, so the only limit to the amount carried was the space available in the rear cockpit. Rain preceding and accompanying the distribution of the seeds and a light growth of grass in the burned area made conditions exceptionally favorable for their growth. It is estimated that in about an hour and a half flying time over the burned area the two men in the plane accomplished as much as two men working on the ground would have done in ten years. His estimate was based on the one acre seeded by hand, this acre requiring thirty-four man hours before the work was completed.

Round Trip of 1500 Miles in One Day

A round trip from Post Field, Fort Sill, Okla., to Chanute Field, Rantoul, Ill., in one day, was recently made by Capt. R. H. Ballard, Air Corps. Leaving Post Field at about 5.00 a. m. to ferry Private Gragory to the Airplane Mechanics School at Chanute, Capt. Ballard greatly surprised the inhabitants of the post by returning at about 7:00 p. m. He utilized a Douglas O-2 airplane and made the outbound trip to Chanute Field, a distance of 700 miles, without stop, in 6 hrs. and 20 min. Returning, he stopped for gas at Kansas City, and required a total of 7 hr. to reach the home airdome, a distance of 800 miles.

Last year, the same trip was attempted by Captain Ballard in a DH-4 but, after 14 hr. of flying, darkness forced a halt at Muskogee, Okla., on the return trip. The distance is about 1500 miles.

Flight to Investigate Reliability of Transport

Lieut. Winfield S. Hamlin, Air Corps, stationed at Fairfield, recently completed a notable airways trip, with Walter Snypp, formerly Secretary of the Dayton Chamber of Commerce, as passenger. Lieutenant Hamlin and Mr. Snypp visited the Chambers of Commerce at all cities en route, and also called at the Washington headquarters of the Chamber of Commerce of the U. S. They met with an enthusiastic reception everywhere. Every stage of the trip was completed on schedule time. Mr. Snypp made the journey for the purpose of obtaining first hand information regarding the reliability of air transport and its suitability for commercial purposes.

Seaplane Repaired at Sea Reaches Base

An F5-L seaplane, forced to alight in the Gulf Stream, 50 mi. from Pensacola, recently was able to get back to port without being towed, due to the ingenious repairs by Lieut. L. N. Medaris, two students and the mechanic, according to the Bureau of Aeronautics.

After the plane had been forced to alight, due to a defective connecting rod, the cylinder was cut out and the plane took off again. The plane managed to reach Santa Rosa Sound, when another connecting rod let go, causing another forced landing. However, the plane was able to taxi home in sheltered waters, avoiding a tow home in the gulf.

Personnel Selected for the Schneider Cup Races

In regard to the personnel of the U. S. Schneider Cup Racing Team for 1926, orders have been issued to the following officers, for duty in this connection:

Lieut. Comdr. Homer C. Wick, U.S.N., Commanding Officer of the Naval Air Station, Anacostia, D. C., has been designated as Officer in Charge of the racing team. Officers who have been ordered to report to him for duty in connection with the races are:

Lieut. G. T. Cuddihy, U.S.N., Anacostia Air Station; Lieut. F. H. Conant, 2d, U.S.N., Bureau of Aeronautics; Lieut. (j.g.) J. J. Glenhart, U.S.N., Scouting Fleet; Lieut. W. G. Tomlinson, U.S.N., Battle Fleet, 1st Lieut. H. J. Norton, U. S. M.C.

It is not known at the present time whether or not Lieutenant Cuddihy is to participate in the races as a pilot, or whether he is to act as Executive Officer of the racing team under Commander Wick thereby lending his experience as a racing pilot to the members of the team.

Three Curtiss planes of the R3C2 Navy Racing type have been entered and three pilots from the above list will be selected to fly them at the races on Oct. 24, 1926, at Hampton Roads, Va.

Asst. Secy. of the Navy E. P. Warner (left) and Major Temple Joyce with the Navy Curtiss Hawk powered with the Pratt & Whitney Wasp 400 hp. engine

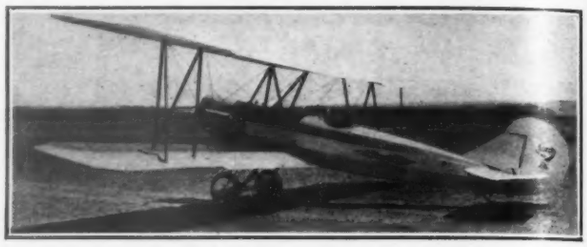
Army Air Orders

First Lieut. Clarence H. Schbacker, Air Corps, to Brooks Field, upon completion of tour of foreign service.

Sec. Lieut. Elmer Florance Knight, Air Corps Res., Orange, Mass., to active duty, Brooks Field, reverting to inactive status March 10.

First Lieut. Arthur William Williams, Air Corps Res., East Dedham, Mass., to active duty Mitchel Field, reverting to inactive status Sept. 11.

ALEXANDER EAGLEROCK
WINS
IN FORD TOUR
OVER ALL OTHER OX5 JOBS



CONTINUED PERFORMANCE UNDER EVERY CONDITION

WITH $2475 ON DENVER FIELD

CONSIDER THE ECONOMY IN OPERATION AND PRICE

DEALERS WITH DEMONSTRATOR EAGLEROCKS ON THEIR FIELDS

Southern California—Aero Corporation of California, Los Angeles
Northern California—W. L. Lamkin, Porterville, California
Michigan—Niles Airways, Niles, Michigan
Indiana—Captain J. A. Yonge, Gary, Indiana
Illinois—Sievert Aircraft Corp., Chicago
Oklahoma and Texas Panhandle—P. R. Braniff, Oklahoma City.

ALEXANDER AIRCRAFT CO.

Associated with Alexander Industries

ROOM 401, ALEXANDER INDUSTRIES BLDG. DENVER

Seamless Steel Tubing
ROUND, STREAMLINE, ETC.

Furnished to Specifications in

STRAIGHT CARBON
NICKEL STEEL
CHROME MOLYBDENUM

Specialists in Aircraft Tubing—Manufacturers for 25 Years.

SUMMERILL TUBING COMPANY

BRIDGEPORT, MONTG. CO. (Philadelphia District) PA.

CAPITAL NEEDED
for Development of Established Airport

WONDERFUL OPPORTUNITY

For right party with capital to help finance one of the most promising commercial aviation developments in the country—important mail terminus—possible government station—No commercial airport in U. S. offers greater possibilities.

Communicate by letter—AVIATION, Box 499

AT YOUR SERVICE

THE MEMBERS OF OUR ORGANIZATION WILL BE AT THE NATIONAL AIR RACES IN PHILADELPHIA IN THE INTERESTS OF OUR AIRCRAFT CLIENTS.

We will be happy to co-operate with those in the aircraft industry who have problems to solve during this epoch-making aeronautical event.

"IT WILL BE A GREAT SHOW"

H. A. BRUNO — R. R. BLYTHE

AND ASSOCIATES

Public Relations Counsel —— *Specializing in Aeronautics*

220 West 42nd Street New York

You Need These Aeronautical Books

AIRPLANE ENGINE ENCYCLOPEDIA — *by Glenn D. Angle* — $7.50.

547 pages. Contains descriptions of 275 makes of airplane engines.
503 illustrations, 356 being outlined halftones and 147 line cuts, of which the majority are cross sections, showing the details of construction.

TEXT BOOK OF AERONAUTICAL ENGINEERING — *by Lieut. A. Klemin.*

$4.50 in U. S. — Other countries $5.25 postpaid.

ENGINE DYNAMICS AND CRANKSHAFT DESIGN — *by Glenn D. Angle* — $4.00. postpaid U. S.

Contents: Reciprocating motion and the travel, velocity, and acceleration of the piston. Connecting rod, centrifugal, inertia, gas pressure, and resultant forces. Torque, torque reaction, offset cylinders, torque variation, and the flywheel. Vibration, inertia balance torsional vibration and rotary balance. Discussion of all conventional and special designs of crankshafts. Specifications for material and heat treatment, and manufacturing processes explained. Stress analyses for all sections of the various types of csankshafts. Tables showing dimensions, stresses, and bearing loads for existing crankshafts. Methods for the determination of bearing loads for any condition. Design of bearings and their lubrication thoroughly treated.

AIRCRAFT INSTRUMENTS

by Herbert N. Eaton, A.M.; K. Hilding Beij, B.S.; William G. Brombacher, Ph.D.; W. Willard Frymoyer, B.S.; H. Brenton Henrickson; Clarence L. Seward, B.S.; David H. Strother, M.S.

10 Photographs and 58 Line Illustrations — 269 Pages Cloth $5.00

This volume is the only complete book of its kind in the English language. It gives not merely a mechanical explanation of the instrument, but also a summary of principles upon which it operates and wherever possible opinions as to its advantages and disadvantages

MAKING THE WEATHER—*by Alexander McAdie*—Price $1.00—postpaid U. S.

WIND AND WEATHER — *by Alexander McAdie* — Price $1.25 — postpaid U. S.

Gardner Publishing Co., 225 Fourth Ave., N. Y. City

Capt. George Caldwell Furrow, Air Corps Res., Bristol, Tenn., to active duty Langley Field, reverting to inactive status Sept. 12.

Major Anthony Earl Von Harten, Air Corps Res., Salt Lake City, to active duty Crissy Field, reverting to inactive status Sept. 10.

Capt. Elliott White Springs, Air Corps Res., Fort Mill, S. C., to active duty Selfridge Field, reverting to inactive status Sept. 11.

Following enlisted men, having qualified for appointment as flying cadet, to Brooks Field, reporting to the com. A. Corps Prim. Sch., for appointment: Privates Donald S. Sheely, Mitchel Field, Joseph A. Bissell, Langley Field, Harold A. Reams, Langley Field, William H. Mann, Maxwell Field, Lee C. Shallenberger, Pope Field, Arthur W. Barrett, Scott Field, Winslow C. Selvig, Scott Field, Glen V. Vanek, Scott Field, John A. Carr, Selfridge Field, Errol C. Crause, Selfridge Field, Berton D. Foster, Selfridge Field, Morris D. Brown, Fort Sam Houston, George B. Manning, Post Field, Frederick H. Johnson, Jr., Kelly Field and Corp. William F. Burton, Wright Field.

Privates William L. Woodruff, West Point, John H. Scruggs, Denver, Serg. Minor E. Rea, Washington and Tech. Serg. Joseph L. Thomas, Fort Worden, Wash., having qualified for appointment as flying cadet, will be transferred in the grade of private to the Air Corps and sent to Brooks Field, reporting to com. Air Corps Prim. Fly. Sch.

Private Charles C. Sipes, Air Corps, Kelly Field, is transferred in the grade of private, to 7th Sig. Serv. Co., Sig. Corps, and will report to signal officer Kelly Field for assignment.

Joseph Chester Dawson, Air Corps Res., Lynn, Mass., to active duty Fort Crockett, Texas, reverting to inactive status Feb. 20.

First Lieut. William Kossuth Andrews, Jr., Air corps Res., Roanoke, to active duty Langley Field, reverting to inactive status Feb. 22.

Sec. Lieut. Benjamin Robert Padgett, Jr., Air Corps Res., Atlanta, to active duty Brooks Field, reverting to inactive status March 10.

Sec. Lieut. Edward Harrison Alexander, Air Corps Res., Battle Creek, to active duty Brooks Field, reverting to inactive status March 8.

Army Air Orders

Maj. George E. A. Reinburg, Air Corps, Chanute Field, to Omaha, reporting to the com. gen. 7th Corps Area for temp. duty. Upon the return of Cap. Robert G. Ervin, Maj. Reinburg will return to Chanute Field.

Sec. Lieut. Ray H. Clark, Air Corps, Fort Sam Houston, to San Diego.

First Lieut. Ned Schramm, Air Corps, San Diego, to Kelly Field.

First Lieut. George V. McPike, Air Corps, relieved from observation and treatment Walter Reed Hospital, and will return to McCook Field.

The 3d Div. Air Corps, 91st Obser. Squad. 15th Photo Sec., Rockwell Field, Calif., to Crissy Field.

Navy Air Orders

Pay Clerk Charles C. Jordon to duty Nav. A. Sta., Lakehurst. Previous orders modified.

Lieut. John H. Gillon to Aircf. Sqdns., Sctg. Flt., orders June 15 modified.

Lieut. James R. Allen det. Nav. Aircf. Fact., Navy Yard, Philadelphia, to temp. duty Nav. A. Sta., Pensacola.

Lieut. Comdr. Maurice R. Prierce det. Aircf. Sqdns., Sctg. Flt., to Nav. A. Sta., Lakehurst.

Lieut. Comdr. Charles G. McCord det. Aircf. Sqdns., Sctg. Flt., to temp. duty Nav. A. Sta., Pensacola.

Lieut. Lawrence W. Curtin det. Bu. Aero., to temp. duty C.F.O., US PN-10 planes.

Lieut. Harry L. Hilton det. 11th Nav. Dist., San Diego, to Nav. A. Sta., Pensacola.

We Are
WACO Distributors
for
NORTHWEST

RANKIN FLYING SERVICE
Portland Box 4268 Ore.

We have for sale one excellent high lift wing plane, built in spring of 1925, very safe and reliable to fly, OXX6 motor turning 1600, good flying condition we want to make room for Waco's $1250.00 Cash.

Perry - Austen
COMMERCIAL
Acetate Nitrate **DOPES** Clear Pigmented

No. 21 Pigmented Eggshell Finish-Nitrate Spray or Brush 2 coats over clear Acetate or Nitrate. Fuselages and wings. Lustrous AUTOMOBILE-like finish. Very attractive, smooth and easy to keep clean.

Perry - Austen Mfg. Co. - Staten Island - N. Y.
Contractors to United States Government

The Aeroplane

Published Weekly

175, Piccadilly, London, W.1
England

CHARLES GREY
Editor

Subscription Rates
for U.S.A.

1 year—$8.50

WIRE FOR AIRCRAFT

Your Life Depends Upon It

John A. Roebling's Sons Company

TRENTON, N. J. Send for Catalog A-484

NITRATE DOPE

NEW PRODUCTION — IMMEDIATE SHIPMENT

Contractors to U.S. Army and Navy

VAN SCHAACK BROS. CHEMICAL WORKS

3358 AVONDALE AVE. - CHICAGO, ILL.

THE CURTISS PULITZER RACING PLANES ARE EQUIPPED WITH OUR SHOCK ABSORBER CORD

Pioneers in the Manufacture of Elastic Cord for Shock Absorbers in this Country.

Principle Producers of Cord for Canadian and U. S. Governments during the World War.

Fully Equipped for the Largest Requirements or Any Experimental Tests.

J. W. WOOD ELASTIC WEB CO.

STOUGHTON, MASS., U.S.A.

New York Office—45 E. 17th St.; Canada—32 St. Peter St., Montreal

A REAL LIGHT PLANE

WITH HARLEY 37 CU. IN. ENGINE

Span 27 feet
Area 75 sq. ft.
Gött. 398 high lift wing
Semi-cantilever monoplane
High degree of stability
48 flights at Bolling Field

Max. speed 65 m.p.h.
Min. speed 38 m.p.h.
Min. load factor of 6
Weight empty 205 lb.
Gross weight 380 lb.
Spruce construction

PRICE $500. F.O.B. WASHINGTON, D. C.

Edmund T. Allen, Air Mail Field, Cheyenne, Wyo.

FERDICO AVIATION

LIQUID MARINE GLUE

Elastic
Durable
Tenacious

Permanent
Resilient
Waterproof

Most perfect Marine Glue ever produced for pontoon construction

WRITE FOR INFORMATION AND SAMPLE.

L.W. Ferdinand & Co.

152 Kneeland Street, Boston, Mass.

FOR SALE

WRIGHT HISPANO-SUIZA, 150 H.P., MOTORS overhauled and complete.

Can supply large quantities.

We are buying and selling large quantities of government surplus supplies. Let us put your name on our mailing list.

SOUTHLAND JOBBING HOUSE

P. O. Box 676, NORFOLK, VIRGINIA

THE NATIONAL AERONAUTIC ASSOCIATION

1623 H Street, N.W. Washington, D.C.

Solicits the Cooperation of

ALL AMERICANS WHO DESIRE TO MAKE AMERICA FIRST IN THE AIR.

We seek, by the promotion and encouragement of civil and commercial air navigation, to contribute to national progress and prosperity and to increase the military safety of the country without giving cause for international jealousy or fear.

METEORPLANE

WORLDS FIRST LIGHT PLANE

IRWIN AIRCRAFT CO.

Established 1908

SACRAMENTO CALIFORNIA

Where to Fly

CALIFORNIA

THE RYAN SCHOOL OF AVIATION

O. B. STAR ROUTE SAN DIEGO

Ideal flying weather all Seasons. Very best of planes and instructors. Opportunity to study latest planes and construction.

A few recommended students will be given employment in our shops, while learning to fly.

CONNECTICUT

NEW ENGLAND AIRCRAFT CO., INC. New England's largest, most complete airdrome, of 96 acres. Commercial flying service. Complete flying instruction. Inter-city passenger and light express service by appointment. Advertising, photography. Our rates are reasonable and we make commercial pilots. Waco 9 distributors for New England.

805 MAIN ST., HARTFORD, CONN.

FLORIDA

Modern planes for any purpose, at any time. Rates reasonable. Flying schools located at Atlanta, Ga., Daytona Beach and Tampa, Fla., where you can fly in comfort in any season. South Eastern Distributors for Swallow Airplanes.

Address all correspondence to A. B. McMULLEN COMPANY

15 PEACHTREE ARCADE, ATLANTA, GA.

IDAHO

WALTERS FLYING SERVICE

BOISE, IDAHO

COMPLETE FLYING INSTRUCTIONS AND GROUND COURSE

Learn to Fly at High Altitude—then you can fly any place

ILLINOIS *Only 50 miles west of Chicago*

EAGLE AIRPORT SCHOOL OF AVIATION.

Herman J. Neubauer, M.D.

Hinckley, Ill.

Learn to Fly at our up-to-date school at very reasonable prices. Complete ground and air course. Come any time. Ideal accommodations for students. Expert instructors. Write for information.

ILLINOIS

MID-WEST AIRWAYS CORPORATION

MONMOUTH, ILLINOIS.

Complete flying instruction and ground course. Large safe field and good airplanes. Distributors for the new Waco airplane.

ILLINOIS

HEATH AIRPLANE COMPANY, Inc.

Oldest aeronautic establishment in U. S.

Airplane Supplies Flying School

2856 Broadway Chicago

ILLINOIS. **YACKEY'S CHECKERBOARD FLYING FIELD.** *Operated by the Yackey Aircraft Co., one of the oldest flying schools in the U. S.* The Yackey Aircraft Co. is conducted by men who have made a success in all branches of flying before the war — — in the war and after the war — — U. S. Army, U. S. Air Mail and Civilian. You can only learn from one who knows. You only know from experience. We have proven our ability. YACKEY AIRCRAFT COMPANY, Forest Park, Illinois.

ILLINOIS **Campbell De Schepper Airplane Co., Inc.** Best equipped commercial field in the middle west. 24 hour service with night flying equipment and used by N. A. T. mail line Chicago to Dallas. A limited number of students accepted for training at reasonable rates. We invite cross country pilots to make use of our facilities.

Mail address 515-18 ST., MOLINE, ILLINOIS.

MARYLAND LOGAN FIELD.

CHESAPEAKE AIRCRAFT COMPANY, Headquarters Armory, Baltimore. Passenger and express service. Aerial photography and advertising. Flying school $250. for course. No bond for solo. *Agents for TRAVEL AIR Planes, Maryland, Virginia & District of Columbia.* Phone Vernon 3760.

MICHIGAN

NILES SCHOOL OF AVIATION

Guaranteed course of instruction in flying. Enroll at any time. No bond for solo flight. Become an expert pilot under expert instructors.

NILES AIRWAYS NILES, MICHIGAN.

MISSOURI

BRIDGETON AIRCRAFT CORPORATION

ST. LOUIS FLYING FIELD ANGLUM, MISSOURI.

Thorough flying instructions by the hour or complete course. Ground and air work given by competent instructors. Only new planes used. A personal interest taken in each student.

DISTRIBUTORS OF THE NEW WACO AIRPLANE.

MISSOURI

MUNICIPAL FLYING FIELD. Rates $15.00 per hour. Come when you can and stay as long as you like. Can use a few students to work out part of tuition. No extra charge for oil or gas. Board and room $8.00 per week. All instruction is personal and no charge for ground school or learning to taxi. *Write* LEE R. BRIGGS, MEMPHIS, MO., *for further particulars.*

MISSOURI

NICHOLAS-BEASLEY AIRPLANE CO. Complete flying instructions, by hour or by complete course, primary, cross country, advance training, solo. New ships and new motors. Instructors who take an interest in you. No deposit required on solo flight. Write for full particulars. MARSHALL, MISSOURI.

MISSOURI

LEARN TO FLY! *ONLY $100.* Our instructors of long experience, our modern training airplanes, and the best flying field in the Middle West make us the best equipped school in the country to teach you to fly properly. *Enroll Now.*

PORTERFIELD FLYING SCHOOL, *Richards Field,* Kansas City, Mo.

NEBRASKA

LEARN TO FLY at the LEXINGTON SCHOOL of AVIATION

LEXINGTON, NEBRASKA

Complete flying course $175.00 or $20.00 per hour, no charge for ground school. Taxi service 20c per mile any where, any time. We fly new planes only. Distributors for Swallow airplanes.—G. R. MORTON, *President*

NEW YORK

CURTISS FLYING SERVICE INC., GARDEN CITY, N. Y.

Complete Flying Service including Instruction, Aerial Photography, Advertising and Passenger carrying. Fast cross country transportation at a moment's notice to any point with either land or water types. Air fleet of thirty machines. Flying the year round. *Big reduction in rates for Flying Instruction.*

Write for information.

NEW YORK

CURTISS METROPOLITAN AIRPLANE CO., INC.

FLYING BOAT SCHOOL PASSENGER SERVICE

Winter Station Jan. 1-May 1 Palm Beach, Fla.

Port Washington, Long Island

NEW YORK

FLYING SCHOOL—Operated in connection with our shops assuring a Liberal Knowledge of Design and Construction at no additional expense. Competent Instructors. *Reliable Machines.* Passenger Flights and Cross Country Service. Write for Details. AERIAL SERVICE CORP., HAMMONDSPORT, N. Y.

YOUR card, in this directory, serves to keep your flying service continuously before the readers of AVIATION at trifling cost.

Write for Rates

AVIATION

225 Fourth Avenue, New York City

OHIO

JOHNSON FLYING SERVICE

DAYTON, OHIO

GRADUATES OF OUR SCHOOL HAVE A REAL ADVANTAGE

A Flying School of Distinction. Write for Further Particulars.

Where to Fly

CONTINUED

OREGON

FLY IN THE NORTHWEST.

RANKIN SCHOOL OF FLYING - 408 Oregon Building.
PORTLAND, OREGON.

PENNSYLVANIA — *PITTSBURGH*

PITTSBURGH-McKEESPORT AIR PORT — 9 miles from business center of Pittsburgh; 2 miles from business center of McKeesport; Fast Interurban Cars past field. *A splendid fourway field — Look for our big circle.* Eastern Distributing Point for Swallow Airplanes. *Office address,* 504 STANDARD LIFE BLDG., Opposite P. O., PITTSBURGH, Pa. *Visitors Cordially Welcome.*

PENNSYLVANIA

PITCAIRN AVIATION, Inc.
Land Title Bldg. Philadelphia.

4-way flying field, largest in East, on Doylestown pike, above Willow Grove.

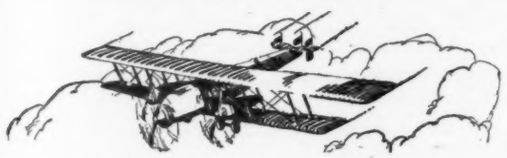
4 instructors, ideal flying country, busy field, reasonable board. Our flying course includes meteorology, map-reading, etc. Waco, Standard, Oriole and Jenny airplanes available for graduate students at low rate. No liability bond required.

WRITE FOR BOOKLET.

TEXAS Year-round Flying

SAN ANTONIO AVIATION & MOTOR SCHOOL
Expert instruction in flying and mechanics
Free sleeping quarters at Airdrome
AIRPLANES, ENGINES, PARTS, SUPPLIES, SHOPS, HANGARS, OX5s, Hissos, Liberties, Jennies, Canucks, Standards
Large stocks on hand, prompt shipment, best values.
Office 509 Navarro Street San Antonio, Texas.

MACWHYTE



On the S-35

Long experience demonstrates that planes gain 10% or more in flying efficiency when rigged with Macwhyte Streamline Tie Rods, which reduce wind resistance to the absolute minimum. Great tensile strength insures safety. These are the reasons why the giant Sikorsky S-35 is completely equipped with Macwhyte Streamline Tie Rods. See our exhibit at the National Aircraft Show. Macwhyte Company, 1220 Racine Avenue, Kenosha, Wisconsin.

Streamline
TIE RODS

INDEX TO ADVERTISERS

A

Advance Aircraft Co. ... 395
Aero Supply Co. ... 431
Aircraft Service Directory ... 440-441-442
Alexander Aircraft Co. ... 432
Allen, Edmund T. ... 435
American School of Aviation ... 431

B

B. B. T. Corporation of America ... 429
Boeing Airplane Co. ... 397
Bohn Aluminum & Brass Corp. ... 396
Bruno, H. A.—Blythe, R. R. ... 433

C

Chicago Aeronautical Service ... 440
Classified Advertising ... 439
Crawford Airplane Co. ... 441
Curtiss Aeroplane & Motor Co, Inc. ... 400

D

Decatur Aircraft Co. ... 440
Detroit Aero Motors Co. ... 442

E

Embry-Riddle Co., Inc., The ... 429

F

Fairchild Airplane Mfg. Corp. ... 425
Ferdinand & Co., L. W. ... 435
Fokker Aircraft Co. ... 423
Fort, Henry K. ... 441

G

Goodyear Tire & Rubber Co. ... 413
Grant Marine Mfg. Co. ... 440
Guggenheim School of Aeronautics ... 441

H

Hamilton Aero Mfg. Co. ... 440
Haskelite Mfg. Corp. ... 429-441
Huff-Daland & Co. ... 440

I

Ireland Aircraft, Inc. ... 441
Irwin Aircraft Co. ... 435

J

Johnson Airplane & Supply Co. ... 426
Jones, Harry M. ... 442

K

Kreider-Reisner Aircraft Co., Inc. ... 441

L

Ludington Exhibition Co. ... 441

M

Macwhyte Wire Rope Co. ... 436
Maine Aerial Service Co., Inc. ... 434
Monumental Aircraft Co. ... 440

N

National Aeronautic Association ... 435
New Jersey Veneer Co. ... 427
Nicholas-Beazley Airplane Co. ... 430-440

P

Packard Motor Car Co. ... 415
Paragon Engineers, Inc. ... 442
Perry-Austen Manufacturing Co. ... 432
Phenix Aircraft Products Co. ... 441
Pioneer Instrument Co. ... 421-440
Polachek, Z. H. ... 441
Pratt & Whitney Aircraft Co. ... 394

R

Reed, S. A. ... 441
Robertson Aircraft Co. ... 424
Roebling's Sons Co., John A. ... 435
Ronald Press Co., The ... 425
Roosevelt Aero Service ... 442
Ryan Airlines, Inc. ... 427

S

S. & W. Airplane Co. ... 440
Schroeder, J. L. ... 441
Scintilla Magneto Co., Inc. ... 399
Service Steel Co. ... 440
Southern Airways, Inc. ... 440
Southland Jobbing House ... 435
Sperry Gyroscope Co. ... 428
Storms Aviation Co. ... 440
Summerill Tubing Co. ... 432

T

Taylor, C. Fayette ... 442
Tips & Smith ... 441
Titanine, Inc. ... 427
Travel Air Mfg. Co., Inc. ... 418-419

V

Van Schaack Bros. Chemical Works, Inc. ... 435
Vimalert Co., Ltd., The ... 427
Vought Corp., Chance ... 398

W

Wallace Aero Co. ... 441
Where to Fly ... 436-437
Wies, Inc., Geo. A. ... 427-441
Wood Elastic Web Co., J. W. ... 435
Woodson Engineering Co. ... 425
Wright Aeronautical Corp. ... 444

Y

Yackey Aircraft Co. ... 440

PUBLISHER'S NEWS LETTER

This winter is to be the critical period for the new air transport companies that have commenced operation in this country. The weather, which has so much to do with regularity of the operation of the air routes, will then have its opportunity to do its worst and the resulting delays will have a decided effect on the traffic that the lines have been able to build up. It is not an impossibility that some of the service will be irregular during the worst stretches of the cold season, and at times the mails sent by the regular rail lines. It will not show a weakness if this situation is faced without any false bravado. The Air Mail has kept its service open during the most severe weather for the last few years, but it has not had to face the problem of income and expenditure, at least from the stockholders' standpoint.

* * * *

If the air lines that have started will regard this first year as one of experiment and not attempt to blossom full blown into a regular transportation service, they will show an intelligent attitude that may in the long run bring them a good return for their caution. The public does not expect accomplishments at first that are beyond the limitations of present aircraft. While it may be hard for some of the more optimistic air transportation enthusiasts to restrain their super confidence, wisdom will be shown by those who take a long range view of air transport in giving the weather all due consideration when making their winter plans.

* * * *

The traffic problem which is the most important one that has to be faced by all the air routes will have become fairly well understood by the time the snow flies and the users of air lines will expect the same service that they have had during the summer. On the lines that operate in the North this will be difficult to give, and rather than to create a spirit of discontent it may be better to frankly face the situation than put in jeopardy all the good work of the past year. Service and regularity are the necessary fundamentals of air transport. When these fail, the confidence of the public is undermined and it may take a long time to rebuild the good-will that might be lost through attempting to do too much. The mail must get through, but when the elements have been unkind to other forms of transportation they have not lost standing because of the delays or because they used any kind of transportation that was available. Those who believe that the Kelly Bill gave air transport its chance in this country, should also recognize that the carrying of mails alone is the most exacting of all services. Passengers and goods have been subject to delays from the beginning of travel, but the mail has to be put through. It is in the same direction that the chief encouragement to air transport came that the chief danger may lie.

* * * *

During the year 1927, the tendency of air transport in this country will take definite trend. Those companies that extend their service to include other branches of aerial activities may have a much better chance than those that simply use their facilities for the transportation of mail goods and passengers. There is no reason why the large overheads that are necessary for the operation of any transportation enterprise should not be used to afford the public the other class of service that has come to be known by the name Aviation gave it—aerial service. Many aerial service companies that have not had adequate financial backing might form alliances with the air transport operators that would be mutually profitable. Taxi facilities for emergencies and even for pleasure trips, aerial photography, some of the simpler forms of aerial advertising, and surveying might add greatly to the revenues of the companies without increasing the overhead at all. It is along these lines that money in aviation has been made in the past and those air transport companies that seize every opportunity to make themselves all around enterprises will reap a reward that may be the difference between the red and the black.

* * * *

The most successful air line in the world, the Scadta which operates in South America has made a striking success by using its facilities in every way it could to make money, as well as from the operation of its air routes. It has even gone so far as to use any idle money in its banks to earn a commission through the transfer of funds. With such an example and a precedent, it will not be a sufficient answer to say that capital is not interested in other forms of aerial work than air transport. Capital is only interesed in an enterprise that shows a promise of a fair return on an investment. If air transport alone in the beginning is not able to carry the burden, then the capital that has been invested in air transport companies will be glad to secure its return from any source, even though it be an allied service to the main enterprise.—L.D.G.

CLASSIFIED ADVERTISING

10 CENTS A WORD, MINIMUM CHARGE $2.50, PAYABLE IN ADVANCE.
ADDRESS REPLIES TO BOX NUMBERS, CARE AVIATION, 225 FOURTH AVE., NEW YORK.

One Seagull, 180 hp. Hisso engine, and other parts, $2,000. Ready to fly away. Bargain. George Flatham, 1800 Southern Boulevard, Bronx, New York City. Phone Tremont 6982.

YOUNG MAN, 22, with three years college engineering, desires position with reliable firm. Wants to learn aviation. Will go anywhere. Write George A. Eniver, Phi Kappa Sigma, State College, Pennsylvania.

FOR SALE: OX5 Jennie, A-1 condition, never cracked, motor turns 1475 on ground. Must sell. Best offer takes it. A. L. Sly, Blytheville, Ark.

CURTISS SEA-GULL, absolutely brand new, with K-6 motor, never flown. Price $4,500. Will take good Waco as part payment. Curtiss Flying Station, Inc., Atlantic City, N. J.

New 135 h.p. Aeromarine six with spares, electric starter, generator, high compression Liberty, heavy shaft and gears, like new. Two new 180 Renault 8, with spares, Dixie double switches $2.00. Metal tipped propellers for all types $10. up. 36-38-40 new navy summer flying suits $4. 39-B floats, M-F spares, radiators, starting cranks for OX. Essington Aviation School, Essington, Pa.

FOR SALE: Curtiss airplane, JN4-D model Curtiss, OX5 motor, 90 h.p., body pigmented, aluminum finish, natural finish wings, used only 25 hours, ready to fly away, $750.00. Thos. J. Dom, 822 Bayridge Ave., Pittsburgh, Pa.

FOR SALE: One JN4-D, good condition. Hammondsport motor, turns 1400. Priced for quick sale, $750.00. Ready to fly away. See E. W. Cleveland, Mayers Field, Bridgeville, Pa.

FOR SALE: OX5, 1475 complete installation for Standard welded tube engine sections, radiator, cowling, propellor, tools and spheres. First $200.00 takes it. Universal Steel Products Company, San Francisco, California.

FOR SALE: New complete OX5 motors $375.00, 80 Le Rhones $90.00, new OX5 parts, Berling magnetos $20.00, carburetors $15.00, exhaust manifolds, pair, $10.00, exhaust extensions, pair, $6.00, government overhauled OX5's, complete $250.00. P. W. Wolff, 7009-11 Stony Island Ave., Chicago, Ill.

PARACHUTES new and used, for exhibition and emergency use, rope ladders for stunt men, balloons, etc. Established 1903. Thompson Bros. Balloon Co., Aurora, Ill., U.S.A.

FOR SALE: Hisso-Standard, with new longerons, new covers, natural finish, motor turns fifteen hundred, price fourteen hundred, for immediate delivery. Write or wire D. H. Davis, Ten Eighteen Byron Drive, Atlanta, Georgia.

FOR SALE: Standards, 1 Hisso, 4 OX5's, 2 Jennies. Natural finish. Ships new, guaranteed. Just tested. Priced to sell this week. Need the space. Eaton Airplane Co., 21 East Third St., Cincinnati, Ohio.

Advertisements inserted regularly in AVIATION'S Classified Section pay for themselves many times over.

WHEN YOU WANT to buy, sell or exchange planes, motors and accessories—or are in need of competent help, or seeking a responsible position AVIATION Classified or "Directory" ads will prove advantageous. AVIATION, as the only weekly, covers your entire field first.

THE Aircraft Service Directory

WHERE TO PROCURE EQUIPMENT AND SERVICES

HAND FUEL PUMP

PIONEER INSTRUMENT COMPANY

MAIN OFFICE AND FACTORY BROOKLYN NEW YORK

WASHINGTON 441 STAR BUILDING — PARIS 97 BOULEVARD SAINT MICHEL — SAN FRANCISCO 15 SPEAR STREET

TRADE HAMILTON MARK PROPELLERS

OX5 water pump assemblies, $6.00. Exhaust manifold, each side $3.50. Crank case, lower half, $22.00, valve intake 30c. Valve exhaust 40c, Standard J-1 upper wings, $50.00 to $100.00. Lowers $30.00 to $60.00. New Standard J-1 airplanes, complete with motors, $900.00 up. Our stock is complete. Immediate delivery. Flying school open the year around. Write for new catalog.

NICHOLAS-BEAZLEY AIRPLANE CO.
MARSHALL, MISSOURI.

AIRCRAFT SUPPLIES

Recent additions to our stock of wide variety and large volume of standard and utility aircraft materials and motor parts now enables us to give you prompt and efficient service.

Send for Catalogue No. 3. Special quotations on quantity orders.

MONUMENTAL AIRCRAFT, INC.
1030 N. Calvert St., Baltimore, Md.

CHICAGO AERONAUTICAL SERVICE
INCORPORATED

Har. 3272 — Wab. 8104

Aerial Photography — Aerial Advertising
Oblique Pictures — Motion Pictures
Mapping — Passenger Service — Freight — Fast Express

FLYING INSTRUCTIONS: BY REGISTERED PILOTS.
Agents for leading types of modern Airplanes.

OFFICE 608 SOUTH DEARBORN STREET

New
— LIBERTY MOTORS —
WITH ALL THE LATEST IMPROVEMENTS.
CAN SUPPLY FROM STOCK ANY NEW "LIBERTY" PARTS DESIRED.
WRITE OR WIRE FOR PRICES.
JOHNSON MOTOR PRODUCTS, Inc.
518 West 57 St., New York.

Curtiss JN4D Airplane complete, less Compass and clock, set-up tested, $750.00, F. O. B. Macon.

S & W AIRPLANE COMPANY
Macon, Georgia.

WE invite the attention of both the experienced Air Mail contractors and those contemplating new express mail, and passenger routes, to our single and multi engined convertible, land or seaplane types of

TRANSPORT PLANES

HUFF DALAND AIRPLANES, INC.
475 Fifth Ave., NEW YORK. *Factory,* BRISTOL, PA.
"Specialists in U. S. Air Service Bombardment Planes"

SPECIAL AIRPLANE SALE. New Jenny, with new motor, ready for assembly, $725.00. New Jenny, assembled and test-flown, $790.00. Slightly used Jenny, $600.00. New Standard, with OX5 motor, $775.00. Hisso, model A, newly assembled, $475.00. New Curtiss OX5 $385.00. Government overhauled $225.00. Our own overhaul $200.00. Very slightly used OX5 $300.00 (practically new). Used, needing overhaul, $92.50. Jenny wings, upper, less aileron, $65.00, lower $50.00.

SOUTHERN AIRWAYS INC.
210 COLLEGE ST. SAN ANTONIO, TEXAS.

DECATUR AIRCRAFT COMPANY
DECATUR, ILLINOIS.
New and Used Ships for Sale
Parts for JN4D-JN4C or Standard J1 Ships
OX5-OXX6-Hisso or Liberty Motors
Complete Flying Course—$150.00
Write for our new catalog

Air Spec. 10225D
SEAMLESS STEEL TUBING
Complete Warehouse Stock
for Immediate Shipment in any Quantity.
SERVICE STEEL CO. 1435 Franklin St. DETROIT, MICH.

BRAND NEW LIBERTY MOTORS
For Airplanes and Speed Boats
Spare Parts for Liberty and Hisso
GRANT MARINE MOTOR CO.
10435 SHOEMAKER AVE., DETROIT, MICH.

YACKEY TRANSPORT
Liberty 12 motor. Landing speed is 32 miles per hour, high speed 125 m.p.h.; useful load 2400; ceiling with load 22,000 ft., duralumin construction throughout. Best performing ship ever known. Price $7,500.00.
Yackey Aircraft Co., Yackey's Checkerboard Airplane Field
Des Plaines River & Roosevelt Road FOREST PARK, ILL.
(Suburb of Chicago)

Will sell cheap for cash, or will trade the following material for good Jennie or Canuck or Standard in flying condition. One 13" screw cutting Prentiss lathe with chucks, attachments, tools, countershaft, etc. One weaver, 28 ton, press. One 80 H.P. Le Rhone motor, new and complete, except hub. *What have you?*
Storms Aviation Co., 20 N. Spruce St., Asheville, N. C.

AIRCRAFT SERVICE DIRECTORY

CONTINUED

Patent Your Ideas

Inventions developed. United States and Foreign Patents secured.—Call or send me a sketch of your invention.

FREE { confidential advice, literature Inventor's Recording Blank.

Satisfactory Terms.

Phone HANOVER 3662.

HASKELITE PLYWOOD

Only Plywood made to pass strict Grade "A" Navy Specifications.

Can be furnished in any size or thickness.

HASKELITE MANUFACTURING CORPORATION

133 W. WASHINGTON ST., CHICAGO, ILL.

EVERYTHING FOR THE AIRPLANE

Send for Our Catalogue

LARGEST AIRPLANE SUPPLY HOUSE IN THE WEST

A complete line of parts and accessories for aircraft at lowest prices. A money-back guarantee on everything sold.

WRITE OR WIRE US YOUR REQUIREMENTS.

CRAWFORD AIRPLANE COMPANY

"Masters of the Air."

350 WASHINGTON BLVD. VENICE, CALIFORNIA

LUDINGTON EXHIBITION COMPANY

Passenger Flying	AGENTS	Spares of All Kinds
Instruction	FOR	Sport Farman Ships
Victor Dallin—	WACO	Aerial Taxi Service
Aerial Photography	NINE	Exhibition Flying

Office: Atlantic Bldg. PHILADELPHIA

Flying from Pine Valley Field PINE VALLEY, N. J.

Acetate Dope

clear and fresh in quality, as sold by me only, with guarantee, in 110 gal. steel drums. A special re-sale lot, not old dope in new containers,—nor so-called reworked, but dope that has the qualities you need. Price $1 per gal. Examination allowed.

HENRY K. FORT Widener Bldg. Philadelphia, Pa.

Daniel Guggenheim School of Aeronautics

Courses in Aeronautical Engineering and Industrial Aviation. For particulars apply to the Dean of the College of Engineering,

N. Y. University, University Heights, New York, N. Y.

The Reed Propeller *(Patented)* *FOREIGN DEPARTMENT*

In production by Licensees in principal foreign countries

Address—S. A. REED, 113 E. 55TH., NEW YORK, N. Y.

U. S. LICENSEE—Curtiss Aeroplane & Motor Co., Inc. Garden City, L. I.

World's Speed Record—1923—Mitchel Field, L. I.; *World's Speed Record*—1924—Istres, France; *Pulitzer and Schneider Cup Winners*—1923-1925; *President's Cup*—Prague—1925; *Beaumont Cup*, Istres, France, 1925; *First Flight to North Pole*, Byrd—1926; *Belgium Congo* (Medaets)—1926; *King's Cup*—England—1926.

TRAVEL AIR Airplanes

GEO. A. WIES, INC.

MINEOLA, NEW YORK

Hangar, Curtiss Field. Office, 250 Jackson Avenue

LE RHONE 80 & 120 H. P. ENGINES

and complete line spares for same.

Write for Prices.

TIPS & SMITH, INC.

P.O. BOX NO. 153 HOUSTON, TEXAS.

JN-4D's, $750.00 and up. Comet OX-5, $2,000.00. K-6 Oriole, metal prop., $1,250.00. Comet K-6, $3,750.00. S.V.A., $1,750.00. Special OX-5 sport plane, $1,500.00. Special Hisso Sport Plane, $1,250.00.

Ireland Aircraft, Inc., Garden City, N. Y.

THE AIRCRAFT SERVICE DIRECTORY

Brings You Into Weekly Contact With

THE ENTIRE AERONAUTICAL INDUSTRY

THE AEROPLANE

PUBLISHED WEEKLY

175, PICCADILLY, LONDON, W.1, ENGLAND

CHARLES GREY, EDITOR

Subscription Rates for U.S.A. 1 year—$8.50

KREIDER-REISNER AIRCRAFT CO. INC.

MANUFACTURERS AND DISTRIBUTORS

of airplanes, aircraft materials and special equipment such as Bedling D81 Booster equipment, special airplanes. Rebuilding and repairing done at moderate prices. Ask for our catalog of JN and OX parts and supplies.

WACO NINE DISTRIBUTORS.

HAGERSTOWN MARYLAND.

Telephone, Hagerstown 2147W (or 2288 at night only)

Actual Size

SEND ONE DOLLAR

We will send you by return mail a beautiful pair of sterling silver wings mounted on bar pin with safety catch, also identification card issued by National Flyers Ass'n. These pins are being worn by thousands of aviators, aviation mechanics and boosters.

WALLACE AERO CO., Bettendorf, Iowa

AIRCRAFT SERVICE DIRECTORY Continued

IMMEDIATE DELIVERY. Complete Hisso Model A Government overhauled motors crated for shipment $525.00. OX5 Standards $700.00 to $1050.00. New Hisso Model E Standards, test flown, $1500.00. New Hisso Model A Standards $1350.00. Hisso compression rings 25c, beveled rings 40c, 3-way Lunkenheimer valves $7.00, Pin or Plate type landing gear (Standard) V's per pair $19.00. New 26x4 tires $7.50. New OX5 coppertipped toothpick propellers $13.50. Spare parts for Standard, Hisso and OX5, instruments, dope, control wire, accessories. Everything sold is guaranteed. Write for prices. P. O. Box 380
J. L. SCHROEDER 6900 Washington Avenue HOUSTON, TEXAS

PHENIX NITRATE CLEAR DOPE
At $1.60 per Gallon in 5 Gallon Boxed Cans
ALUMINUM NITRATE DOPE
For Two Coat Finish Over Four Coat Clear at $2.35 per Gallon in 5 Gallon Boxed Cans
Immediate Shipment f. o. b. Factory
Phenix Aircraft Products Co. Williamsville, N. Y.

THE DETROIT AERO MOTORS CO.
10331 CHARLEVOIX AVE.,
DETROIT, MICH.
Hispanos, 180 and 300 H.P.
Anzanis, OX5's, new and used.

JONES' WHOLE OUTFIT
At Old Orchard Beach, Maine.
Standard OXX6, three-place, balloon tires, M.F. Boat, 180 Hisso motor, one Salmson motor, one Waco, 90 H.P. OX motor, one Waco, 100 H.P. OXX motor, parts for two 220 Hisso motors, one steel hangar 50 x 50 ft. Exclusive rights on this beach, which is nine miles long and smooth as a billiard table
Will sell entire outfit or any part immediately.
Address Harry M. Jones, Box No. 35, Old Orchard, Maine.

FOR SALE: Orenco Light Transport, a strictly modern, 5-passenger commercial airplane, with side-by-side dual in rear cockpit, high speed, 110 m.p.h., landing 40, ceiling 19,000, gas capacity 85 gals., price complete, with 180 Hisso and Reed propeller, $3,750. New Standards $1,000. up, good Jenny $800., 2-place Newport $500.
ROOSEVELT AERO SERVICE
WESTBURY, LONG ISLAND, N. Y.

PARAGON PROPELLERS
BETTER THAN EVER
Paragon Engineers, Inc.
Baltimore, Maryland

WILLIAM E. ARTHUR & CO., INC.
103 PARK AVE., NEW YORK CITY
Engineers and Builders
HANGARS — AIRPORTS — FLYING FIELDS,
DRAINAGE, LIGHTING SYSTEMS, EQUIPMENT, ETC.
A SATISFIED CLIENT OUR MOTTO.

C. FAYETTE TAYLOR, M. E.
Consulting Mechanical Engineer
Massachusetts Institute of Technology
CAMBRIDGE, MASS.
Specialist in Aeronautical Engines and Marine Engines

AERONAUTIC SAFETY CODE

A Compendium of the Results of Four Years' Study by Leading Engineers, and Government and Civilian Experts of the Aircraft Industry

Sponsored by the U. S. Bureau of Standards and Society of Automotive Engineers, and Approved by the American Engineering Standards Committee, October, 1925.

The Aeronautic Safety Code covers

GOOD PRACTICE AND SAFE METHODS
in the Design, Construction, Testing, Operation and Maintenance of Aircraft, Aircraft Engines and Accessories, Airdrome and Airway Equipment

It includes

SENSIBLE RULES OF THE ROAD AND SAFETY PROVISIONS FOR FLYING AND GROUND PERSONNEL

Fifty-two Pages - Well Indexed

AN ESSENTIAL REFERENCE GUIDE FOR THOSE WHO WISH TO BUILD UP PUBLIC CONFIDENCE IN AIR TRANSPORT.

SINGLE COPIES $1.50

A year's subscription to AVIATION (52 issues, $4.00) and a copy of the Safety Code for $5.00.

GARDNER PUBLISHING CO.
225 Fourth Ave., New York

Use the Coupon

GARDNER PUBLISHING CO.
225 Fourth Ave.,
New York.

Check (X) in Square

☐ Enter my subscription to AVIATION and mail me a copy of the AERONAUTIC SAFETY Code. Five dollars to cover is enclosed.

☐ Mail to address below — copy or copies of the AERONAUTIC SAFETY CODE, AT $1.50 each, for which I enclose $

(Name) .....

(Address) .....

AN INDEX TO

AVIATION

Covering the contents of the twenty-six issues included in Vol. XX, January to June, 1926—

NOW READY *for* FREE DISTRIBUTION

This index is the key to a wealth of aeronautical information, shows the comprehensive and authoritative character of the material published in AVIATION each week, and will prove of great value for ready reference purposes.

It will be published for each succeeding volume.

If you are not a regular reader of AVIATION, send for a free copy of the Index — a glance at the titles will quickly show why

AVIATION is the Indispensible American Aircraft Publication.

GARDNER PUBLISHING CO., Inc.

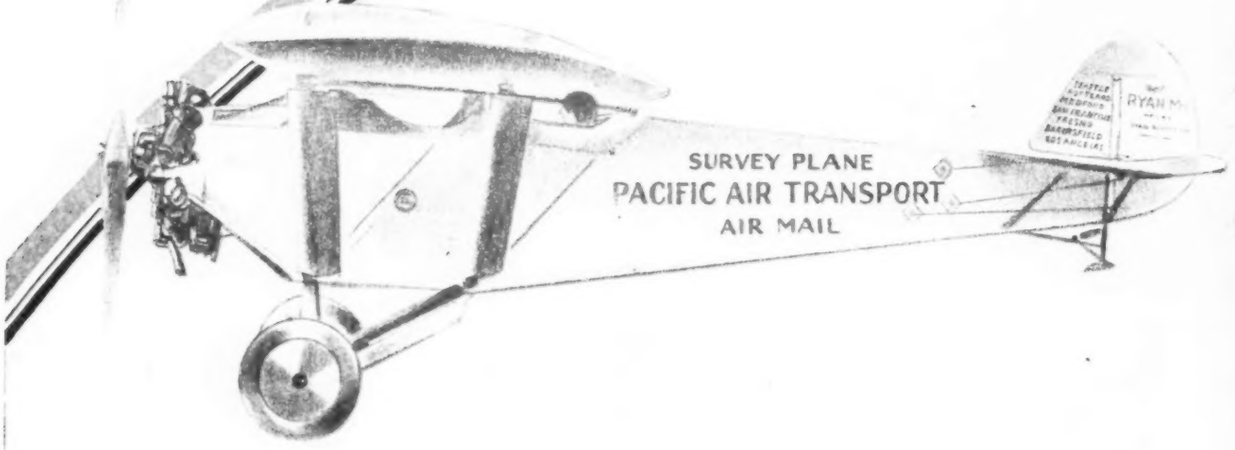
225 Fourth Avenue New York City

More Pilots Know More About

WRIGHT WHIRLWIND ENGINES

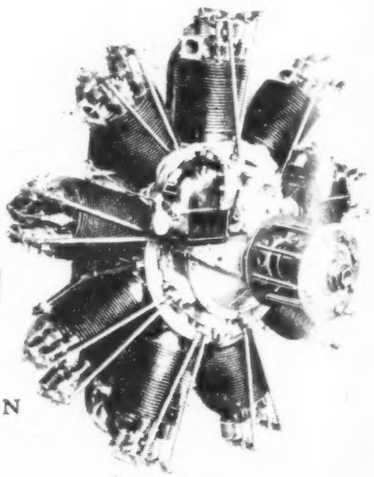
than any other Aeronautical Engine now manufactured in America!

That's why *More Pilots fly them!*



Ryan Air Lines, Model M-1, passenger and mail plane, powered with a Wright Whirlwind 200 H.P. Engine.

Send for Bulletin No. 8



WRIGHT

WRIGHT AERONAUTICAL CORPORATION

Paterson, N. J., U. S. A.